the OIL AND GAS JOURNAL

World Wide Prestige through Superior Performance

North, South, East, West... wherever men drill for oil, Hughes Tools are recognized as the Standard of the Industry . . . a reputation earned through thirty-five years of superior field performance. The world-wide prestige accredited Hughes Tools is a tribute to the quality and dependability developed during these years of progressive manufacture.

Hughes
TOOL COMPANY
HOUSTON TEXAS

PRICE 20 CENTS MAY 26, 1945

HALLIBURTON

JELOIL

JELOIL is an oil-base drilling mud with a very impressive performance record.

JELOIL supplies what most operators have long wanted—a drilling fluid that does not leak water into the oil sand which is being drilled, and which will prevent "spalling" of shales.

Where JELOIL has been used, operators report: (1) productive wells that might otherwise have been dry holes; (2) greatly increased production, particularly where gas pressure is low.

HALLIBURTON OIL WELL CEMENTING CO.

DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1945, by The Petroleum Publishing Co.

Vol. 44, No. 3 May 28, 1945

P. C. LAUINGER, *President* — C. O WILLSON, *Editor*

S. H. ROURKE, *Business Manager* — H. STANLEY NORMAN, *Managing Editor*

R. C. MAC DOUGALL, *Circulation Manager* — ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor* — PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS — NEIL WILLIAMS

CHARLES J. DEEGAN — KENNETH B. BARNES

R. B. TUTTLE

District Editors

JAMES McINTYRE, Tulsa 1, 211 S. Cheyenne Ave. — THOMAS F. SMILEY, Tulsa 1, 211 S. Cheyenne Ave.

TOLBERT R. INGRAM, Denver 2, State Office Bldg. — E. H. SHORT, JR., Houston 2, Sterling Bldg.

HENRY D. RALPH, Washington 4, Natl. Press Bldg. — L. P. STOCKMAN, Los Angeles 14, Union Oil Bldg.

A. C. MacINTYRE, Oil City, Derrick Bldg. — O. C. PRESSPRICH, Saginaw, News Bldg.

VICTOR LAURISTON, Chatham, Ont., 35 Stanley Ave. — FABIAN R. STALEY, New York 17, 415 Lexington

Advertising

E. KLAPPENBACH, *Vice President*

KENNETH J. LANGLEY, *Eastern Manager*, New York 17, 415 Lexington Ave. — CRAIG ESPY, *Pittsburgh Manager*, Pittsburgh 19, Grant Bldg.

C. R. FARMER, *Chicago Manager*, Chicago 2, 185 W. Madison — J. HOWARD TINKHAM, *California Manager*, Los Angeles 15, 1406 S. Grand Ave.

WAYNE RIVES, *Gulf Coast Manager*, Houston 2, Sterling Bldg. — A. J. CHAMBERS, Beckenham, Kent, England, 33, The Avenue

MITCHELL TUCKER, *Manager, Research Dept.*, Tulsa 1, 211 S. Cheyenne Ave. — JOHN D. REILLY, *Production Manager*, Tulsa 1, 211 S. Cheyenne Ave.

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

Oil Industry Asks Freedom to Operate in Foreign Lands 108
Crawford Becomes Maloney Officer 110
Harris to Become President of U.O.P. 110
Oil Drum Proves Military's Most Versatile Tool 112
Pacific Northwest Is Receiving Exploratory Attention 114
Refiner Must Know Fuel Components, Technologist Avers 117
Gasoline Forecast Left to Government Agencies 118

Trends 107
This Week 111
Editorial 115
International News 116
Deaths in the Industry 118
Refining News 174
Natural-Gas News 177
Pipe-Line News 178

ENGINEERING AND OPERATING

Fully Equipped Floating Tank Batteries in Coastal Louisiana 120
Bending Device for Tubing and Small Pipe 122
Electronics—Its Application to Petroleum Technology 123
Mechanics of Production Series — No. 29 — Displacement Factors 139
Questions on Technology 147
Modern Drilling—Cardwell Model O Draw Works 150
Unusual Measures Employed in Workover Job 152
Engineering Fundamentals 161
The Refiner's Notebook 163
Oil and Gas Equipment Digest 169

EXPLORATION AND DRILLING

Week's Highlights 181
Completions in All Fields 181
Daily Average Production for Week 182
Reports by Areas Start on Page 182
Wildcat Completions and Discoveries 193
Summary of April Completions 198

ADDITIONAL FEATURES

Drilling Contractors 194
Market Summary 195
Personals 196
Classified Advertising 199
Events on the Calendar 202
Advertisers' Index 202

Devine
REFINERY EQUIPMENT

Fractionating Columns	Heat Exchangers	Pressure Vessels
Bubble Towers	Condensers	Kettles, Vats
Evaporators	Coking Drums	Dryers
	Tanks	Special Equipment

DEVINE-BUILT TOWER

10 Ft. Dia. x 71'3"

The DEVINE plant is equipped to build vessels of any size to ASME or API-ASME code specifications.

Complete Engineering Service
Expert Fabrication

DEVINE offers years of experience in the oil refining field, *plus* the most up-to-date fabricating methods. DEVINE Engineers are prepared to design single units or complete layouts, or the equipment can be built from your own drawings and specifications in Devine's modern shops. In either case, you can be certain the completed job will meet the most exacting requirements. Let DEVINE Engineers figure on your next job.

J. P. Devine Division

H. K. PORTER COMPANY, Inc.
PITTSBURGH 22, PENNSYLVANIA
Factories: Mt. Vernon, Ill. — Pittsburgh, Pa. — Blairsville, Pa.
McKeesport, Pa. — Newark, N. J. — New Brunswick, N. J.

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 182

CRUDE-OIL STOCKS 221,596,000 bbl. as of May 12—up 577,000 bbl. One year ago 234,706,000 bbl.

GASOLINE STOCKS 89,950,000 bbl. as of May 12—down 1,391,000 bbl. One year ago 87,674,000 bbl.

RESIDUAL FUEL-OIL STOCKS 38,948,000 bbl. as of May 12—down 555,000 bbl. One year ago 50,505,000 bbl.

GAS OIL AND DISTILLATE STOCKS 28,996,000 bbl. as of May 12—up 196,000 bbl. One year ago 30,755,000 bbl.

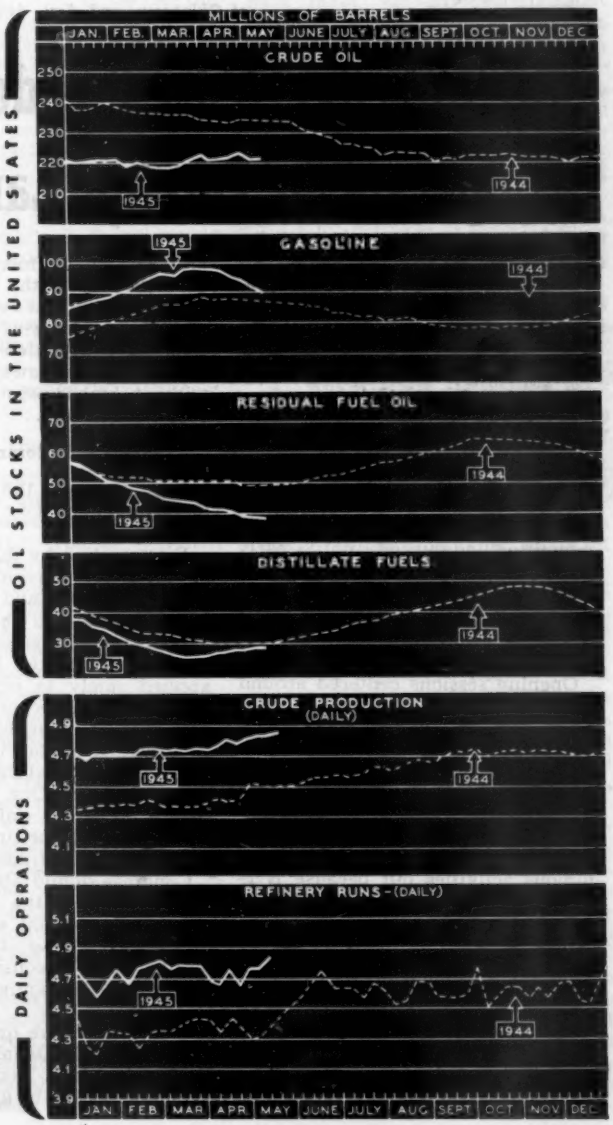
CRUDE OIL PRODUCTION 4,862,800 bbl. as of May 19—up 10,500 bbl. One year ago 4,525,950 bbl.

REFINERY RUNS 4,850,000 bbl. daily week ended May 12—up 64,000 bbl. One year ago 4,431,000 bbl.

THE petroleum industry is to hear more about the disposal of its surplus war property in the months ahead. It has been stated repeatedly that the disposition of property no longer required for war use is relatively a simple problem for the petroleum industry to solve. So far as consumer goods is concerned this statement is unquestionably true. It is believed that as stockpiles of gasoline, fuel oil, lubricating oils and other military products become available they will be absorbed by private operators adjacent to the areas in which they are located.

IT becomes increasingly apparent that the disposal of petroleum's capital goods will not be so simple. This is not due so much to the type of goods or the expenditures involved in their purchase by private operators as it is to their significance in relation to policies which extend outside the petroleum industry. This situation is reflected in the fact that one of the six main divisions of the petroleum resources investigation of the O'Mahoney committee, which started last week, has to do with the postwar disposal of pipe lines, tankers and refineries. In regard to refineries consisting largely of 100-octane, toluene and butadiene plants it has been assumed that in most cases leasing arrangements would be worked out with the present oil-company operators after the conclusion of the Japanese war. It is now understood that difficulties have developed because of the additional outlays that will be involved in converting some of the plants to the production of peacetime goods. In some cases, it is stated, commercial operation in the postwar period does not appear possible, and junking or complete rebuilding will be necessary. Considerable variation in terms of leasing arrangements will also be necessary in the case of the 100-octane plants depending on type of process, plant location and other existing equipment.

THE matter of pipe-line and tanker disposal is still more complicated. Continued ownership and possible operation by Government is being suggested in some quarters. In the case of tankers, disposal is being tied in with the application of international policies which have not been determined and may not be until months after final victory. Because of sectional conditions and the competitive products involved, it is predicted that the postwar use of the Big-Inch and Little Big-Inch pipe lines may become a political issue of considerable magnitude.



Governmental officials hear testimony from oil men as the inquiry into international cartels gets under way. Seated at table are: John A. Loftus; Edward S. Mason; Asst. Secy. of State Will Clayton; Henry Fraser; Secy. of Interior Harold L. Ickes; Sen. Joseph C. O'Mahoney, committee chairman; Atty. Gen. Francis Biddle; W. T. Kelly, attorney for Federal Power Commission; Sen. E. H. Moore of Oklahoma, and Asst. Atty. Gen. Wendell Berge

Oil Industry Asks Freedom to Operate in Foreign Lands

WASHINGTON. — Broadening its program to a full-scale inquiry into international cartels, the Senate oil investigating committee, in joint session with a subcommittee of the judiciary committee, last week opened hearings which may pave the way to a United States cartel policy and write a "rule of responsibility" for United States businessmen engaged in foreign operations.

Following testimony by government and oil-industry officials, the committee adjourned until early June when, under the chairmanship of Sen. Joseph C. O'Mahoney, it will continue its program of investigation of petroleum resources and operations.

Opening sessions centered around Senator O'Mahoney's foreign contracts registration bill, S-11, which would require registration of foreign contracts containing restrictive provisions with the Department of Justice. The oil industry, O'Mahoney said, is not singled out for the cartel discussions because it is given to dubious activities but because it is a "global industry."

The industry's position was presented by W. S. S. Rodgers, chairman of The Texas Co., who told the committee that unless the U. S. Government can get foreign countries to adopt the American system of competitive enterprise, oil firms must be permitted to operate abroad in conformity with national laws and practices or be forced to abandon their position in the foreign market.

Without world-wide anticartel agreement, American operators should be permitted to do business under foreign laws and customs, without embarrassment from their own government.

Rodgers' Recommendations

Rodgers made the following recommendations for governmental policy:

1. Promotion by the United States of voluntary agreements to eliminate monopolies and cartels.

2. Pending such international agreements, Congress should make clear that antitrust laws are to be applied solely to protect and promote internal economy, and that American agreements abroad are governed by applicable foreign laws, trade customs, and intergovernmental agreements. Our antitrust laws should not apply unless foreign activities directly or unreasonably restrain domestic trade.

Congress should also provide that, in determining the reasonableness of alleged restraint of trade within the United States, the benefits of foreign trade be considered in terms of national economy and national security.

Answering three questions on immunity cited in O'Mahoney's outline for the hearings, Rodgers said that immunity should be given from antitrust actions where acts were previously approved by the Government. That immunity should not be accompanied by governmental regulation. Immunity would be expected for any arrangement in the foreign field which does not restrain domestic trade.

The O'Mahoney bill, Rodgers said, is objectionable because it further complicates an already complex situation. The bill fails to solve the antitrust problem, and would place American nationals at a disadvantage with foreign competitors. Passage of the bill in its present form, he predicted, would lead to an international reporting service promptly relaying commercial imformation to competitors abroad.

"If a clear definition of foreign contracts could be written which would eliminate filing purely local contracts and require only those of international scope to be filed," Rodgers said, "I would not object."

Industry witnesses were introduced by Orville Harden, vice president of Standard Oil Co. (New Jersey), who stated the position of the Committee of Five's cartel group as being opposed to cartels, but believing it imperative that American petroleum interests continue to operate in foreign markets.

James Terry Duce, official of Arabian American Oil Co., presented charts showing the world resources of oil, both proven and estimated.

Laurence B. Levi, director of Socony-Vacuum Oil Co., Inc., outlined various foreign-government laws and restrictive plans controlling oil distribution and sale within their borders before the war.

The oil industry, Levi said when questioned by Assistant Attorney General Berge, has nothing to hide

and does not fear that registration of foreign agreements would reveal illegal dealings.

Quotas imposed upon U. S. operators by foreign governments should not place American nationals in jeopardy of antitrust action, Berge said. Earlier, Attorney General Biddle had indicated that U. S. firms dividing a quota arbitrarily set by, for example, Spain, might be in danger of antitrust prosecution for preventing other firms from participating in the Spanish business.

State Department Plan Revealed

Opening testimony by government officials revealed a State Department plan to seek international agreement on world-trade policies, and established support, with some reservations, of the O'Mahoney bill.

Pointing out that a private cartel is really a private tariff, Biddle warned that many cartel arrangements disrupted by the war are now being resumed, and cited effects of German cartel system in weakening productive capacities of this country. Registration of foreign agreements, he said, could have protected the United States from being caught short in the field of rubber and other vital war materials after Pearl Harbor.

"There should have been compulsion for making public the agreement between an American firm and a Japanese company whereby, in 1939, the American firm felt obligated to turn over to the Japanese some of the secrets and industrial know-how for making aviation fuel. An American company which enters into such an agreement should be entitled to say that it hid nothing and let the American public know," Biddle said.

Registration of cartels, Biddle said, cannot be interpreted as legalizing or sanctioning cartels. He warned that the bill, unless carefully worded, could lead to sanction and thence to government control of international business.

Hitting at the heart of the disagreement between Government and industry on the cartel question, Biddle stated flatly that "the truth is that in most cases the cartels cannot survive if the American companies do not participate."

Both Biddle and Assistant Secretary of State Will Clayton agreed that no separate government agency should be set up to administer the nation's anticartel legislation when developed. Federal Trade Commission witnesses expressed the belief that the solution of the problem lay in administrative control.

Clayton advanced a broad plan for international conferences and international coordination of policies to meet cartel problems. The State Department will seek an agreement with other nations prohibiting the participation of commercial firms in contracts and combinations restraining international trade, restricting access to markets or fostering monopolistic control.

Such an agreement should be enforced within each country, rather than by an international organization, but he recommended the establishment of an international office of business practices, tied into the United Nations organization through the Economic and Social Council.

Assistant Attorney General Wendell Berge also supported the bill, and developed his case against cartels with a long list of known agreements, with special emphasis upon the 1929 contract between Standard Oil Co. (New Jersey) and I. G. Farbenindustrie. Under this, Berge said, Standard protected its monopoly in natural petroleum, got the world rights on the oil process and gave I. G. the chemical business. Under the terms of the agreement, Berge said, Standard was permitted to engage in the chemical business in the United States "only as an I. G. junior partner."

As a result, this country lacked information, experience, and know-how to manufacture buna rubber, and only shortly before Pearl Harbor, Standard was still living up to its agreement and cooperating to keep other American firms out of the synthetic-rubber field, Berge said.

His interpretation of the Standard-I. G. agreement was challenged sharply by Harden. "When we made this deal in 1929," Harden said, "public reaction was entirely favorable."

Peculiar Question Posed

The Berge testimony, Harden said, brings up the question of how an American business man in the future could solve the type of problem which confronted Standard in 1929 without subjecting himself to official criticism more than 10 years after the event.

Standard paid $35,000,000 for patents which, Harden said, "we considered of enormous importance to the oil industry." The only way the company could get that technology was to agree to use it in the oil business, and not in the chemical business outside of oil. "We got in the purchase all we could get."

Out of that purchase, Harden went on, came the development of 100-octane gasoline, synthetic toluene for the TNT of over half the country's war explosives, and the technique for making synthetic rubber, especially from oil.

Pointing out that Standard got the best trade it could, against an alternative of not getting the technology and permitting the Germans to move years ahead in research, Harden said that without the 1929 deal the Germans would have had full control of vitally important patents up to the time of Pearl Harbor.

"We would have been glad to disclose the full terms of these agreements to the Government at any time had there been any requirement or even procedure for doing so. We had nothing to hide. No one showed interest in the details."

"It is inevitable that as the world progresses," Harden said, "problems and circumstances similar to ours will face one American businessman after another throughout the world. I assume it is one of the objectives of this hearing to write the answers to questions of this kind. I hope this joint committee can devise a sound way to guide American businessmen in their future course."

Concluding witness was Brig. Gen. H. L. Peckham, liaison officer for petroleum, who testified that the War Department "would not look with favor on any arrangement which would deny to U. S. nationals access to a fair proportion of foreign petroleum resources."

"If such access cannot otherwise be obtained," Peckham said, "the War Department favors such arrangements, approved by the U. S. Government, as will give access on a basis of fair competition." Peckham pointed out that the evolution of the development, processing, and use of petroleum in the United States occurred under a system of free enterprise and as a result of the efforts of an industry characterized by the most vigorous competition.

Would Draw Distinction

R. J. Dearborn, president, Texaco Development Corp. and chairman of the patents committee of the National Association of Manufacturers, told the committee that a clear distinction should be drawn between patent licenses and other forms of agreements.

NAM is firmly opposed to cartels, both domestic and international, whether private or governmental, he said. But the public has erroneously been led to believe that a patent license restrains trade although it is actually a waiver of the patent owner's right to exclude others from making his invention. He declared that a cartel is to restrain trade, the antithesis of a patent license.

Dearborn urged the encouragement of exchange of scientific information through patent agreements, but said they should be recorded with the Patent Office rather than the Department of Justice to avoid duplication of work. He endorsed the recommendation of the National Patent Planning Commission for registration of all patent agreements in foreign trade but said domestic registration should not be required for simple nonexclusive licenses of U. S. patents.

H. D. CRAWFORD O. W. MALONEY J. S. WARREN

Crawford Becomes Maloney Officer

HAROLD D. CRAWFORD, president of the Crawford Tank and Supply Co. of Dallas, has purchased controlling interest in Maloney Tank Manufacturing Co. of Tulsa, and will move to Tulsa at once to assume the duties of secretary and treasurer of the company. Crawford has severed his official connection with the Crawford Tank and Supply Co. He is the son of the late David Crawford of Parkersburg, W. Va., who with his brother John M. established the Parkersburg Rig and Reel Co.

O. W. Maloney will continue as president and chief executive officer of the company. He is the son of the founder, O. W. Maloney, Sr., who was the original patentee of the bolted steel tank. The company has been in continuous operation in Tulsa since 1915, during which time it has developed a world-wide business. The war period has witnessed a considerable expansion of the company's products.

J. S. Warren, chairman of the board, has sold his stock interest in the company, along with that of Mrs. Harry Ross, to Crawford. Warren is completely retiring from active service. During his 30 years with Maloney Tank he has become one of the most widely known men in the oil-equipment business.

J. C. Highfill will continue as vice president and general manager, and no other personnel changes are involved. The company will continue to manufacture bolted steel tanks and accessories, to which has been added a complete line of welded tanks, separators, heaters and treaters.

Harris Becomes U.O.P. President

DAVID W. HARRIS and B. R. Muirhead were elected president and treasurer, respectively, of Universal Oil Products Co., at a directors' meeting in Chicago May 22.

Thomas W. Bowers, formerly president and chairman of the directors, will continue to head the board. Joseph G. Alther, vice president and director, resigned from both offices but agreed to continue association with U.O.P. as a consultant. Macauley Carter, treasurer and assistant secretary, resigned both offices but will remain in the U.O.P. organization. The new U.O.P. president said that no changes would be made in operations of the company except that engineering, research and service activities will be intensified.

Harris and Muirhead resigned May 17 as president and treasurer, respectively, of Arkansas Natural Gas Corp., Shreveport, and its subsidiaries, which include several refining and allied manufacturing interests.

D. W. HARRIS

For more than 15 years, Harris has been one of the top officers of Arkansas Natural. From 1928 to 1944, he served the Arkansas Natural companies as vice president and general manager. He became president of the parent company and its affiliates in October 1944. Before moving to Shreveport, Harris held several positions with Cities Service Co. and its subsidiaries in Denver, Bartlesville, Okla., and New York.

Among companies under Harris' management as chief executive of Arkansas Natural interests were Arkansas Fuel Oil Co., which operates a refinery near Shreveport; Arkansas Louisiana Gas Co., and Arkansas Pipeline Co. Harris directed Arkansas Natural operations in acquiring substantial producing and undeveloped interests in East Texas, in the Carthage gas field, Louisiana, Mississippi, Alabama and other southeastern states.

U. O. P. is one of the leading development, licensing and construction organizations in the refining end of the industry. The company owns and licenses patents on many of the modern refinery processes.

Last year, assets of U. O. P. were placed in a trust agreement administered by the Guaranty Trust Co., New York, for benefit of the American Chemical Society. Proceeds from the trust are being used by the A.C.S. in advancing the scientific work of the Petroleum Research Fund. Donors to the trust account were Shell Oil Co., Inc., Standard Oil Co. of California, Standard Oil Co. (Indiana), Standard Oil Co. (New Jersey), The Texas Co. and N. V. de Bataafsche Petroleum Maatschappij.

API Announces Medical Advisory Committee

NEW YORK.—A medical advisory committee, charged with consideration of subjects involving medical problems peculiar to the oil industry, is announced by American Petroleum Institute. McIvor Woody is chairman and D. V. Stroop secretary of this standing committee, which will foster gathering, exchange and dissemination of scientific information among medical men in the industry.

Mississippi River Fuel's Rates to Have Hearing

WASHINGTON. — Reasonableness of rates charged by Mississippi River Fuel Corp. in connection with transportation and sale of natural gas will be the subject of a hearing to be held June 6 by Federal Power Commission. The commission began an investigation of the rates 2 years ago.

THIS WEEK

DRILLING—Nation's operators completed 1945 record total of 557 wells last week, up 11 from previous high. . . . Intensified activity ascribed to milder weather conditions, relaxed spacing restrictions in many areas, willingness of operators to expand equipment from inventories feeling that replacements will be forthcoming. . . . ¶World's producing-depth record broken by Shell Oil Co., Inc., in South Louisiana. . . . Producer completed at 13,530 ft. in Miocene, on Weeks Island dome, New Iberia Parish. . . . Old record producing depth, also in Louisiana, was 13,503 ft. . . .

PRODUCTION—Petroleum Industry War Council forecasts 1945 crude-oil producing rate at 4,737,000 bbl. daily, up 150,000 from last year. . . . ¶Florida's second oil well appears better than discovery but crude is low gravity, pay zone deep. . . . ¶Another peak hit in national crude-oil production—4,862,800 bbl. daily, up 10,500. . . . California chief contributor with surge of 19,500 to new record of 945,250 bbl daily. . . .

INTERNATIONAL—Industry pleads for freedom to operate in foreign oil countries according to customs prevailing therein. . . . Unless United States can decartelize world trade practices, domestic companies want privileges of competing on equal footing. . . . Antitrust laws, spokesmen assert, constant threat to domestic corporations doing business abroad. . . . especially as currently interpreted. . . . ¶Venezuela production rising with emphasis on Lake Maracaibo. . . . Development drilling concentrated on eastern Venezuela fields. . . .

TRANSPORTATION—Materials in prospect for rebuilding transportation capacity including new tank cars. . . . ¶Railroads move 8-month-record average of 555,208 bbl. of crude and products to East Coast during V-E week. . . . Longer hauls to West Coast and Pacific military bases exerting maximum pull on tank-car and tanker supply. . . . Situation to become more acute before it improves. . . . ¶Plans advancing for Iraq Petroleum Co.'s 16-in. line from Kirkuk to Haifa. . . . ¶Eastern Mediterranean, focal point of one existing and two large projected pipe lines, dominates postwar tanker centers. . . .

RATIONING—Extent of civilian-gasoline increase remains uncertain. . . . OPA wants to maximize relaxation, PAW wants to remain ready to meet all military demands, regardless of time, place or volume. . . . ¶PIWC elected to leave government agencies free to work out problems of how much more gasoline, when and for whom. . . . Best guesses are that motorists will net increase of about 100,000 bbl. daily. . . . OPA must adjust allocations for overdrawing PAW quotas in earlier months this year, to tune of 45,000 bbl. daily. . . .

—Acme Photo

Undamaged derricks found standing in Netherlands East Indian oil fields were left intact by the Jap forces for a reason. Jap snipers have been stationed atop derricks in Tarakan, pouring withering machine-gun fire into Allied invading forces. After picking off the Nips, however, the derricks serve the highly useful purpose of supporting workover and cleanout tools for rehabilitating the wells

Gasoline storage dump on Iwo Jima. The Navy handles oil in bulk wherever possible, but enormous numbers of drums will always be needed for two main purposes

Oil Drum Proves Military's Most Versatile Tool

by Henry D. Ralph

This is the second of a series of articles the Journal's Washington editor will write from his notes and observations collected while visiting, as a war correspondent, Navy fueling and operating bases in the Pacific military theater. As one of a selected group of business paper editors to make a personal inspection of important supply centers on the road to Tokyo, Ralph was furnished background and factual data by Navy personnel, which furnish the basic information of these dispatches.

IN the Central Pacific—The steel oil drum is virtually the trade mark of American occupation of a Pacific island.

Wherever our forces go ashore they take drums full of fuel and water to keep them fighting during the initial stages of the assault, and as fast as the drums are emptied they are put to some other use. The variety of uses is endless, and some times it appears to a visitor that an empty 55-gal. drum is the most versatile of all military equipment and one of the most essential.

Oil shippers in the United States have been told that drums have gone to war, and the full meaning of that statement is evident out here. There must be millions of them in the Pacific, and very few of them are idle.

The fact that so many drums are being used for something other than to carry oil is a bit embarrassing to the Navy petroleum supply officers, and they are making strenuous efforts to get the empties sent back to central points for reconditioning and refilling. Much progress is being made, but there always seems to be something more important to do than gathering empties and loading them on to returning ships, and besides a drum is no good after it has been cut in two or buried in the ground.

So it appears that the demand for drums in the Pacific will continue to increase, but the increase will not be in proportion to the increase in the volume of petroleum products used. The ratio will fall off because of the drum-salvage program, because a greater proportion of the oil will be handled in bulk, and because much of the future fighting probably will involve land-mass operations as distinguished from island assaults. The Army, when it takes over the bulk of the fighting in Asia, probably will be supplied by pipe lines, as in Europe, and will prefer the 5-gal. "Jeri-cans" to 55-gal. drums for many purposes, whereas the Navy's use of these cans is relatively small.

Thirty Types of Lubes

The Navy handles oil in bulk wherever possible, but tremendous numbers of drums will always be needed for two main purposes—during the initial stages of an invasion and for routine handling of lubricants and specialty products.

About 30 different types of marine lubricants are needed for the various types of ships used by the Navy, and other types of lubes are needed for aircraft and for land equipment. Drums are also needed for the specialty products required in varying accounts, such as fog oil for smoke screens, kerosene for stoves and lamps, and what the Navy calls "white gasoline"—a 60-octane unleaded gasoline used for stoves and other nonautomotive purposes. Large quantities of these drummed products are kept in storage at every naval supply depot, whether at a rear or forward base. About 90 per cent of this packaging is now done on the Pacific Coast, but there are several drum-filling plants at Pacific bases, and more are planned.

Bulk handling methods are used for the four main products—Navy special fuel (black oil), 50-cetane diesel, 80-octane all-purpose motor fuel (mogas), and 100-octane aviation gasoline (avgas). But bulk handling cannot be used during the early stages of an invasion and occupation, so many thousands of filled drums must be assembled for such an operation.

Now Routine Operation

Supplying the oil for a beach assault is a complicated process, but it has been done so often that it is now routine.

The planning, of course, starts months in advance of D-day, and dovetails with the strategic plan at every point. These plans cover the first 150 days of occupation, and for this period the Area Petroleum Office of the Pacific Fleet Service Force, located at Pearl Harbor, is responsible for the supply. All the oil to be used during this period is carefully computed and assembled in drums, ready to move out on ships under a detailed schedule.

Of course the Area Petroleum Office also has to plan for the bulk products used by the fleet, the landing craft, and the supply and service "train" or noncombatant ships. Some idea of the fuel requirements of a single assault can be obtained from the figures of the Marianas campaign which officially covered a 9-week period from June 9 to August 11, 1944.

D-day on Saipan was June 15, but fleet units reached the area several days before that. From then on there was constant fighting on Sai-

pan, Tinian, and Guam until all three islands were "secured" in mid-August.

This campaign involved over 600 ships and nearly 300,000 Navy, Marine, and Army personnel, who were over 1,000 miles from our nearest base, and approximately 6,000 miles from the United States.

Petroleum operations involved the use of 24 Navy fleet oilers, which, in turn, were supplied by War Shipping Administration tankers. The fleet oilers shuttled back and forth between the fleet, fueling at sea.

Nearly all of the fuel and diesel oil for this operation came from the Netherlands West Indies, whereas the gasoline came from the U. S. West Coast. Somewhat over 100 T2 tanker loads of bulk petroleum were required for this operation. Approximately 9,000,000 bbl. of fuel oil, 30,000,000 gal. of aviation gasoline, and 700,000 bbl. of diesel were required.

In addition, over 200,000 drums of fuels, lubricants and greases were consumed as lubricants in the fleet, in airplane engines or by the land-based forces.

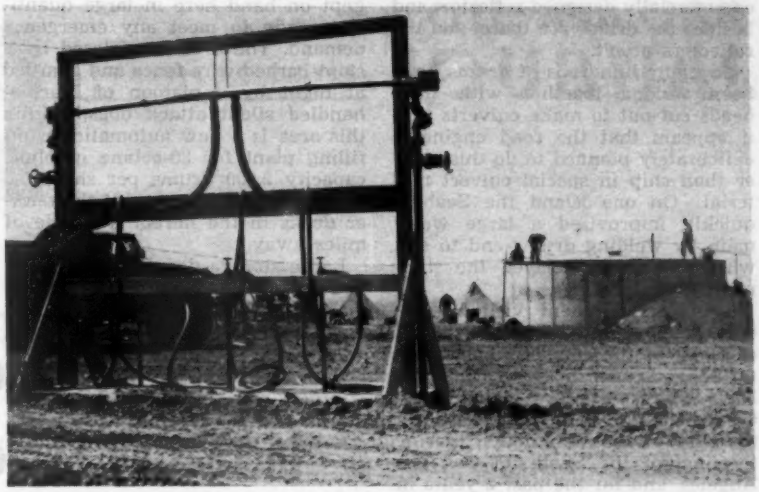
Figures do not include the requirements for the Pearl Harbor area, bunkering of merchants vessels in the forward areas, or the requirements of the South Pacific area under the command of General MacArthur.

Platoon Has Responsibility

Each individual platoon that is going ashore is responsible for the petroleum products it will need during the first 30 days. Even small units like the Marine dog platoon and the first graves registration squad figures out its own needs for oil and takes its supply ashore. These oil supplies are "combat loaded", that is, they are so arranged on the landing and supply ships that what is needed first will be unloaded first.

Perhaps a single drum of mogas and a couple of cans of lube oil to run one jeep for a few days will be steel-strapped to a wooden pallet along with rations and other equipment, numbered for a certain platoon, and loaded on a landing craft or assault transport in a designated place. This pallet of supplies goes ashore with its unit, which probably will cut the straps on the way to the beach and manhandle the individual packages to its designated sector. By this system each unit has the oil it needs during the first few days of the amphibious assault before regular supply lines are established.

As soon as a beach-head is secured the oil drums come ashore in increasing numbers. Trucks already loaded with drums roll right onto the beach from the mouths of LST's. More drums come up in cargo slings from the holds of freighters offshore and are dumped into landing craft for transfer to the beach. Often the drums must be floated ashore and rolled up the beaches by hand. As soon as the construction battalions can throw up some sort of dirt or pontoon wharf the oil drums are unloaded directly into trucks and hauled off to camps, airstrips, tank and truck refueling spots, bulldozers on the job, or dispersed storage areas.



Tank construction on Iwo Jima has hardly been completed before oil products are flowing into them through the pipe lines. Already auxiliary lines have been buried in the ground leading from the tank to the "filling station" in the foreground. A truck is driving in to fill up for servicing distant battle equipment

This goes on for 150 days, with the quantities of drummed petroleum increasing daily as more and more men and motors are in action, and all planned out in detail in advance. By D-plus 90 there is a fuel officer ashore who has assembled data on future requirements of all the units in his area, and he starts requisitioning for all petroleum products for D plus 151, D plus 180, and so on.

Lt. A. J. Young, officer in charge of the Ewa Junction drum storage, drum filling, and drum reconditioning plant (left), and Lt. D. A. Singleton, deputy fuel coordinator for the 14th Naval district, Pearl Harbor (right), explain to Ralph how the Navy handles drummed products for shipment to forward areas

Long before this time arrives it is probable that the SeaBees will have thrown up a number of 1,000-bbl. bolted steel "quick-up" storage tanks and laid a submarine pipe line out to a mooring buoy so that tankers can start bringing in bulk shipments of diesel, mogas, and avgas. Then the need for drums in that area begins to fall off, but the lubes and specialty products will always come in drums.

1,001 Uses for Drums

By this time there should be thousands and thousands of empty drums lying around the island which ought to be shipped back and reused. They are there, all right, but they have already been reused. Those ingenious SeaBees, who boast about their ability to improvise and do anything with nothing, have found 1,001 ways to use an old oil drum.

They slit them open lengthwise with a cutting torch, spread them apart into a broad arch, and roof their foxholes with them. They mount one on posts, punch holes in it, and have a shower bath. They line a bunch in a double row, bulldoze an earth ramp around them, and they have a grease rack. They split them in two lengthwise, paint the insides white, fasten light bulbs inside, and tie them to a palm tree so they can have plenty of illumination for night work—they say a half drum is better for this than a

commercially designed reflector, and besides the drums are there, and the reflectors aren't.

So many hundreds of drums have been welded together with their heads cut out to make culverts that it appears that the road engineers deliberately planned to do this rather than ship in special culvert material. On one island the Seabees quickly improvised a large water main by welding drums end to end when something delayed the shipment of water pipe.

This correspondent visited some of these installations on the island of Ohau in the company of several former oil men now wearing the Navy uniform. These included Lt. Comdr. J. W. Malseed, formerly manager of the Wilmington marine terminal of the Shell Oil Co., Los Angeles, and for the past 2 years in charge of the fuel annex of Naval Supply Depot, Pearl Harbor; his assistant for the past 15 months, Lt. J. P. Golden, for 27 years a sales representative for the Texas Co., and Lt. D. A. Singleton, formerly assistant to the manager of the eastern division of Valvoline Oil Co., Edgewater, N. J., now deputy fuel coordinator for the Fourteenth Naval District.

Diesel Drumming Plant

A new diesel drumming plant was in full operation although its construction was not yet completed, filling drums by gravity flow from storage tanks in the hills above, but so close to the harbor that they can be loaded directly by the pumps on the tankers. This plant usually has about 50,000 empties on hand, and more are not far away in other storage areas. Filling is done by modern automatic machinery, and the standard fill is 53 gal. to a 55-gal. drum. As fast as the drums are filled they are loaded onto trucks by "cherry-pickers" — motorized cranes with chain hooks which pick up four drums at a time. The trucks take the drummed diesel to docks or storage areas for ultimate use by shore installations on this and other islands which are not now equipped to receive diesel oil in bulk by pipe line or tank truck.

One such storage area is Ewa Junction in the hills back from Pearl Harbor. It is in charge of Lt. A. J. Young, who for 10 years had been superintendent of the Buffalo terminal of Frontier Fuel Oil Corp. before joining the Navy 2 years ago, and before that had had 15 years of experience in the oil business with Pure Oil Co., Tide Water Associated Oil Co., and The Texas Co.

This particular depot covers some 250 acres and will hold about 1,000,000 drums. It is divided into 26 areas, each of which will take from 12,000 to 27,000 drums. All types of drummed petroleum products are kept on hand here in large quantities ready to meet any emergency demand. The area is enclosed by a stout barbed wire fence and guarded at night by a platoon of Marine-handled silent attack dogs. Within this area is a new automatic drum-filling plant for 80-octane gasoline, capacity 2,000 drums per shift, fed by a pipe line from one of the tanker docks in the harbor a couple of miles away.

Large storage depots of drummed petroleum products are necessary at every Army and Navy installation in the Pacific even after an island has been equipped with bulk storage tanks and facilities for unloading tankers. Many posts and activities cannot readily be served by tank trucks, and fuel must be brought in drums to places where bulldozers and other machines are operating.

There is no doubt that the steel drum is a highly essential article in this war—just as essential, in its humble way, as an aircraft carrier or a radar set.

Pacific Northwest Is Receiving Increasing Exploratory Attention

THE Pacific Northwest seems to be drawing an increasing amount of attention from wildcatters, both major and independent, although nothing approaching a major campaign appears to be in sight.

A wildcat being drilled by the Sharpless Corp., on the north side of Gray's Harbor, near Aberdeen, Wash., is reported to have run into a gas zone around 3,000 ft., and to have developed mechanical trouble. Other wildcats have been drilled in this general vicinity in past years, and it is reported that two structures are fairly well defined, on which gas has been found in past years, but not of commercial importance.

Ohio Oil Co. drilled a deep test in the Aberdeen area in 1932, which was abandoned at 6,726 ft., when it ran into heavy flow of hot water. Considerable gas was found in shale in this test between 2,000 and 3,000 ft., but the well was considered noncommercial.

The Texas Co. is reported assembling a rig for deep drilling on a test to be located somewhere in the state of Washington, but details of company's acreage block and location of well are not yet known.

The Standard Oil Co. of California is reported taking leases on a block approximately 5 miles square in Whatcom County, Washington, just south of the British Columbia border. As the area involved is subdivided into small farms and dairies, Standard's blocking is said to require dealing with approximately 700 fee owners.

The Richfield Oil Corp. is negotiating for leases with officials of Multnomah County, Oregon, just south of the Washington border, Portland being the county seat. The company is proposing to lease 3,000 acres of county-owned land in the western part of the county, on reported basis of a 5½-year lease at $1 per acre.

In the southeastern part of Oregon, in Harney County, local business men around Burns, have formed a company and are reported preparing to drill a wildcat. Exact location of this test has not yet been announced.

There are of course many more blocks of leases held than those listed; they merely represent recent developments. There have been several wildcat tests drilled over the years both in Washington and Oregon with no commercial production resulting. However there seems to be a definite revival of interest, possibly due to the necessity of importing large quantities of oil into the Pacific Coast area to meet the demands of the Japanese war.

PAW Lifts Restrictions on Industrial-Plants Inventories

WASHINGTON. — A temporary restriction on motor-fuel and fuel-oil inventories of industrial plants, secondary suppliers and other large-scale consumers on the East Coast has been lifted, Deputy Petroleum Administrator Ralph K. Davies has announced.

The restriction, adopted January 17, 1945, prohibited deliveries to such users if they had a normal 10-day supply, or more, in storage, but did not affect storage in private dwellings, refineries, bulk terminals, or retail filling stations.

Tulsa Geologists Elect

The Tulsa Geological Society, at its final meeting for the year 1944-45, elected the following officers to serve during the next fiscal year: President, A. N. Murray, University of Tulsa; first vice president, Paul E. Fitzgerald, Dowell, Inc.; second vice president, Oscar Hatcher, Helmerich & Payne, Inc.; secretary-treasurer, Glenn R. V. Griffith, U. S. Geological Survey; editor, Charles J. Deegan, The Oil and Gas Journal.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Oil Investigators' Handbook

ANOTHER oil hearing is under way and again the question is being asked how the petroleum industry can rid itself of the distinction of being the most investigated enterprise in the business world. We suggest, as a starter, a specially prepared handbook of the petroleum industry for prospective investigators.

This particular investigation is justified by its sponsors as necessary to secure information covering petroleum resources having postwar significance. The first testimony indicates that the oil business is to be the guinea pig in the discussion of a future governmental policy as regards cartels, which are of no more importance to the oil business than they are to a large number of other enterprises with international markets.

Except for this subject and one or two others, this O'Mahoney investigation will largely traverse ground already covered in previous congressional inquiries. Weeks will be required in accumulating thousands of pages of testimony to be added to the many thousands piled up by previous reports.

The petroleum industry has nothing to fear from this investigation except the possible misrepresentations of outside critics who are accustomed to use legislative hearings as sounding boards for views which they hope will gain nation-wide attention. We have no quarrel with the main objectives of this inquiry.

The point we are raising is that some method must be devised to end the practically continuous investigation of this industry. At a time when every key man of a petroleum organization is doing the work of two, many are now required to go to Washington to prepare and present petroleum's case. Many millions of dollars are spent annually in petroleum investigations.

Then there are the time of the investigating committee and all the associated expenses of a governmental hearing. Of special importance at this time is the matter of transportation and the use of other overcrowded wartime facilities.

We also wonder about the reactions of citizens from Maine to the West Coast who are constantly reading and hearing about these oil hearings. The fact that no serious charges or complaints against the oil industry come out of these investigations is overlooked in the natural public suspicion that where there is so much smoke there must be fire.

The solution we have in mind would revolve around a compilation of the petroleum industry's vital data based largely on the testimony that has been presented at the request of legislators and departments of government. A competent non-oil committee would analyze in abbreviated and convenient form all the information that has been presented in recent years. The chairman would be an outstanding, nationally known economist.

Members of the Senate and House of Representatives would have the answers to most of their oil questions in this report, which would include complete bibliographies for those desirous of carrying on intensive studies. Any additional information required could be quickly supplied by oil associations and the operating companies.

"You forget the political aspects of these investigations," the critics of the plan may say, feeling that recurrent interrogations of this industry are inevitable because of their vote-getting value. Admittedly, no handbook could take care of that assumed requirement. Our answer is that the time is not far distant in affairs of government when more stress will be placed on competence and less on political strategy.

INTERNATIONAL

Creole's Production in Venezuela Continues Rise

Creole Petroleum Corp. increased Venezuelan production in April to 441,219 bbl. daily, an increase of 16,135 bbl. over March and 102,905 bbl. per day above output in April 1944.

Lake Maracaibo properties of Creole produced 309,019 bbl. and the eastern fields, including Cumarebo, accounted for 132,200 bbl. of the April production. A year ago, Lake fields produced 265,804 bbl. daily while the eastern areas yielded 72,510.

Bulk of the increase in Creole's April production came from the Lake Maracaibo district where output was up 13,051 bbl.

Creole's two Venezuelan refineries at Caripito and La Salina processed 30,828 bbl. of crude daily in April.

The company completed 22 wells in April, including 20 producers and two dry holes. Nine of the new producing wells were in the Jusepin field and five were added at Mulata, to head the list in development drilling.

Soviet Government Orders 20 Portable Oil Rigs

Twenty portable oil rigs, estimated to cost more than $1,000,000, have been ordered by the Russian Government from Franks Manufacturing Corp., Tulsa. The rigs, capable of drilling to a depth of 5,000 ft., will be mounted on special caterpillar tread so they can travel through Russian fields in which no roads exist.

Franks previously had sold some 110 truck-mounted rigs to Russia since 1939. The new order was placed by the Soviet purchasing agency in Washington 2 weeks ago, and it is not connected with lend-lease. The Soviet will pay cash.

The rigs will consist of derrick, power plant, pumps and all essential equipment mounted on a single unit with special caterpillar rear tracks.

Chinese Oil Problem Studied by PAW Official

Martin J. Gavin, assistant director of the foreign refining division of the Petroleum Administration for War, has returned from 2 months' investigation of petroleum conditions in the interior of China.

Gavin's findings are now being reported to military authorities. They will not be made public because of security regulations.

The PAW official left for China February 17 at the special request of the National Resources Commission of the Ministry of Economic Affairs of China to advise that country on matters concerning petroleum and synthetic fuels for Free China as a part of the war program.

He was a guest of Dr. Wong Wenhao, Minister of Economic Affairs in Generalissimo Chiang Kai-shek's cabinet and chairman of the Chinese War Production Board.

New Cantagallo Well Started; One Testing

Cia. Petroleos del Valle del Magdalena, Colombian affiliate of Socony-Vacuum Oil Co., Inc., has started drilling on its 7 Cantagallo, in the Magdalena Valley, and testing operations are under way on 6 Cantagallo, which is bottomed at 7,322 ft.

Sinu Oil Co., another Colombian affiliate of Socony-Vacuum, is shut down at 6,264 ft. at 1 Floresanto, a wildcat operation in the Sinu district.

Colombian Petroleum Co., jointly owned by Socony-Vacuum and The Texas Co., has three active operations in the Barco section. Colombian 17 Socuavo is testing at 5,080 ft., 18 Socuavo is drilling at 1,630 ft., and 4 Tres Bocas, a projected test to the Cretaceous, is sidetracking at 3,150 ft.

R. W. Gallagher, right, chairman, Standard Oil Co. (New Jersey) presents J. A. Alonzo, president of its affiliate, Standard Oil Co. of Cuba, with a diamond-studded pin honoring his 40 years with the company. Alonzo joined Standard of Cuba as a salesman in 1903, and was elected president in 1938

Drilling Resumed at Deep Prince Edward Island Test

Drilling operations have been resumed on Socony-Vacuum Oil Co. and Cities Service Co. 1 Hillsborough, Prince Edward Island exploratory operation which was shut down throughout the winter because of severe weather conditions and location of the drillsite over the St. Lawrence waters. The 1 Hillsborough is drilling currently at 12,350 ft., ranking it one of the deepest tests yet drilled in Canada. A description of the ingenious location was published in the November 18, 1943, Journal.

Colombian Improvement Confirmed by Final Data

Production of crude oil in Colombia in 1944 increased 70 per cent over the preceding year, amounting to 22,647,476 bbl. compared with 13,261,065 bbl., according to the Foreign Commerce Weekly. Exports of crude oil were 73 per cent larger than in 1943, or 18,561,431 bbl. compared with 10,723,862 bbl. Refinery throughput increased from 3,427,718 bbl. to 3,854,742 bbl.

The output of Colombian refineries was sufficient to supply most of the refined petroleum and petroleum products consumed in Colombia with the exception of the Pacific Coast and Cauca Valley requirements, obtained from Talara, Peru, and certain lubricating oils and aviation gasoline imported from the United States.

The major oil companies operating in Colombia intensified their explorations for new wells during the year. Wildcat drilling operations continued to bring encouraging results. The sharp rise during the year in the number of applications for concessions was indicative of the trend. In 1943, there were 13 applications and in 1944, a total of 78. The combined holdings of all United States companies in Colombia approximate 10,000,000 hectares (24,710,000 acres).

The companies have managed to increase the total proved reserves and have stimulated production by the efficient and ingenious use of the short supplies of material and equipment. No concession was declared in default in 1944.

Machinery for Developing Fields Reaches Mexico

TAMPICO.—More than 30 truckloads of machinery for drilling oil wells has arrived here from Tulsa, Okla. It will be used by the Petroleum Administration for developing newly explored areas in Tamaulipas, Vera Cruz and Neuvo Leon.

Refiner Must Know Fuel Components, Technologist Avers

by Arch L. Foster

WICHITA.—Scientific and technologic advances which have made this country the greatest industrial and military power in the world will continue to keep us in the lead position under a system of private enterprise, declared Dr. Gustav Egloff, Universal Oil Products Co. research director, in an address here May 17 before the Wichita section of the American Chemical Society. Developments in fuels have progressed in 3 years at a rate equivalent to the normal peacetime advances of 10 years or more, he said, in surveying the world petroleum situation.

The 1-day meeting covered several of the more important subjects of major interest to petroleum chemists including motor - gasoline properties, catalytic developments, refining of modern lubricating oils and the use of spectrophotometry as an analytical tool in refining.

The refiner in the postwar period must know even more of the properties and peculiarities of the different motor-fuel components if he is to build the most efficient gasoline and obtain the best over-all performance, Jane Jordan, technologist for Ethyl Corp., told the assembled chemists. Illustrating the important characteristics of different types of fuel and fuel components with a large number of comparative charts, Miss Jordan showed how the borderline knock test method of rating octane number in motor fuels is utilized as a refiner's tool, and how it appears to give the best over-all indication of road performance of any of the methods developed in recent years. Actual road tests must be used to determine the actual performance of fuels, she said. Extrapolation of octane ratings trends, prewar, to 1945 shows that we normally could expect 79 octane for house-brand, 83 for premium fuel, if the war had not come.

Knock Tendencies

Straightrun gasolines knock most at low speeds, the speaker showed, with comparatively low knock tendencies at higher speeds. Thermally cracked fractions high in olefinic components knock less at low speeds but show their severe knock tendencies at higher, cruising speeds. By combining both types of fractions into composite fuels along with other blending materials such as natural gasoline, catalytically cracked naphtha, tetraethyl lead, etc., the refiner can produce a fuel the entire knock curve of which lies above the curve of the average engine, that is, the fuel will not knock at current compression pressures. The thermally cracked component should be present especially among the light-end components of the fuel, Miss Jordan said, since light cracked material knocks less. Straightrun fractions and catalytically cracked products may make up the heavy end of the distillation curve to give a fuel which is balanced in antiknock tendencies throughout its boiling range.

Advances in Lubricant Refining

Choice and sequence of refining steps has an important effect on the properties of finished lubricating oils, Vladimir Kalichevsky, Magnolia Petroleum Co., stated in discussing lubricating - oil refining advances. Raw oil fractions contain paraffin waxes, desirable and undesirable oil components, and asphaltic material in which may be included resinous matter, he stated. For example, if asphalt is removed to a value below some unknown but determinable minimum line, subsequent solvent extraction shows a greater decrease in carbon residue. As an instance, a raw lube fraction showing 3.5 carbon residue when deasphalted to 3.1 carbon residue yields, when solvent extracted, a carbon residue of 1.5. When the same fraction is deasphalted to 2.9 carbon residue, similar solvent extraction produces an oil of only 0.7 carbon residue.

Wide variations are possible in the properties obtained by using different extraction conditions on the same raw oil, Kalichevsky said.

One of the great losses is "good" oil in the wax cake, he said. A strong effort is being made to develop dewaxing processes which lose a minimum of oil in this manner. Viscosity-gravity constant is a good factor for evaluating crude lube fractions, he stated, but varies unaccountably on refined products. Silicones are for specialty products, he observed, stating that little is known yet of their stability. Silicones are too costly for making large amounts of lubricants now. As to possibilities in lubricants, Kalichevsky stated: "I prefer carbon in my engine to pieces of rock", referring to the silicon content of the silicone molecule.

With a catalyyst typified by 84 per cent alumina Al_2O_3, 8 per cent chromic oxide, Cr_2O_3 and 8 per cent antimony tetroxide, Sb_2O_4, the tetroxide proved to be a strong catalyst promoter in the aromatization of aliphatics, Dr. C. M. Hollenbeck, of Skelly Oil Co.'s research department, stated. Precipitated together, these materials catalyzed the aromatization of commercial heptane to 63 per cent at 550° C., and to 86 per cent at 570° C. Without the antimony components the yields were 49 per cent and 70 per cent, respectively, of total aromatics in each case. Pressures were essentially atmospheric. Heavy straightrun gasoline was aromatized 58 per cent at 530° C. without antimony, 69 per cent with the tetroxide. Pressure distillate was aromatized 44 per cent without the promoter, 58.5 per cent with Sb_2O_4. Apparently little extra efficiency was found above about 4 per cent antimony oxide. The on-stream cycle was about 4 hours, and regeneration returned the catalyst to nearly original efficiency. Up to 70 hours running on one batch of catalyst showed no appreciable diminution of its activity, Hollenbeck said. One anomaly in this work was the failure to aromatize hexane, which cracked to form methane, hydrogen, etc., but no benzene.

Use of spectrophotometry as a tool in aiding research and refining operations was presented by C. K. Buell of Phillips Petroleum Co.'s research department. Buell showed how the work is carried out, and how the method saves time. The method will not supersede low tempemature distillation, he said, but each will supplement the other.

Pittsburgh Geological Society Organized

PITTSBURGH. — A regional society "to advance and disseminate geologic knowledge, and to provide a forum for geological problems" has been organized at Pittsburgh under the name: Pittsburgh Geological Society. Details of organization culminated at the April meeting when the constitution and bylaws were adopted.

The organizing committee was headed by George C. Grow, Jr., who has also been selected as president of the society for the year 1945-1946. Other first year officers are Raymond E. Birch, vice president; W. B. Robinson, secretary, and Dr. Shailer S. Philbrick, treasurer. These officers, together with the following, comprise the council: Robert E. Bayles, Hugh R. Brankstone, C. H. Feldmiller, Dr. Richard M. Foose, John T. Galey, David K. Kirk, and Dr. J. H. C. Martens.

Gasoline Forecast Left To Federal Agencies

WASHINGTON. — An inconclusive discussion about how much motor gasoline may be available to civilians now that the European war is over and what sort of statements should be made to the public on this subject was the only high spot of the Petroleum Industry War Council meeting last week.

Because of lack of definite knowledge of gasoline availability it was decided to leave all statements to government officials for the present, and the committee on petroleum economics refrained from issuing its customary forecast of supply and demand of petroleum products.

This committee did, however, issue a revised edition of its book of charts showing trends in the petroleum industry since 1918, which indicated that the output of gasoline this year will be only slightly less than that of 1944 despite increased requirements for petroleum war products.

The report estimated crude production in 1945 at an average of 4,737,000 bbl. daily, an increase of 150,000 bbl. daily over 1944.

The PIWC also issued a supplement to its preliminary proposal for a national oil policy, including a statement on natural gas policy which outlined twelve proposals for conservation of natural gas and government relations with the industry while retaining the private ownership and competitive status of the industry.

Ohio Oil Co. Announces Personnel Changes

FINDLAY, Ohio. — Several new appointments and changes in The Ohio Oil Co. have been announced by W. B. Emery, vice president and manager of production.

C. J. Hares, division geologist at Casper has been placed in charge of geologic research for foreign fields and foreign prospective oil and gas provinces.

After receiving his B.A. and M.A. degrees in geology from Syracuse University and a fellowship in geology at the University of Chicago, Hares was associated with the U. S. Geological Survey for 7 years. In 1917, he resigned the position of paleontologist with the U.S.G.S. to become Ohio Oil's first geologist. He picked several other geologists to form the nucleus of the company's geologic department and has actively participated in the development of that department during the past 28 years, having served in nearly all of the company's producing territories. He is the author of a number of geologic treatises.

R. W. McCanne has been appointed division geologist at Casper succeeding Hares.

Upon completion of his studies in geology at the University of Colorado, Columbia University, and the University of Chicago, McCanne became a junior geologist for The Ohio Oil Co. in 1931. In 1934, he was appointed a geologist, the position he has held until his recent appointment as division geologist.

F. R. Clark, division geologist at Tulsa, has been assigned to the handling of special problems involving geology and related matters in the Tulsa division, effective May 4, 1945.

Backed by years of geological experience with the U.S.G.S. Clark has been with the Ohio company since 1923, when he was appointed division geologist for Texas, Oklahoma, and Kansas. In 1936, he was appointed to the position of vice president. He received his education from the University of Utah, graduating in 1910, with a B.S. degree. In 1933, he was president of the American Association of Petroleum Geologists.

R. A. Koenig, formerly division geologist and acting manager of the Findlay division, has been appointed division geologist at Tulsa. Koenig joined the Ohio Oil in 1937 as district geologist at Hobbs, N. M. In 1940, he became division geologist at Findlay and later was made acting assistant manager of that division.

Effective May 4, R. L. Fillner, landman for the Findlay division, has been appointed acting superintendent and division landman to assume all of the supervisory responsibilities in that division formerly carried by Koenig.

I.P.A.A. Membership Meeting Scheduled

WASHINGTON.—A full meeting of the Independent Petroleum Association of America will be held in Tulsa October 15 to 17, it was decided at a meeting of the executive committee here last week.

The executive committee adopted a statement favoring a strong and active domestic petroleum industry, opposing large imports of oil, favoring a national code of fair trade practices in petroleum marketing, opposing federal regulation of natural-gas production and conservation, and requesting an increase in the ceiling prices for crude oil.

There was considerable discussion of a permanent price differential for crude oil produced from stripper wells and secondary-recovery projects, such as is now in effect through government price subsidy, but no agreement was reached.

DEATHS

Philip G. Gossler, 74, chairman of Columbia Gas & Electric Corp., died May 18 in New York. With the late George W. Crawford, president of Ohio Fuel Corp., Gossler in 1926 directed the merger of that company with Columbia Gas & Electric Co., thus uniting two of the country's leading natural-gas systems. He served as president of the new organization until 1936, when he was made chairman of the board. He was a director of Guaranty Trust Co. of New York and a trustee of Edison Electrical Institute. Gossler received a B.S. degree in 1890 and an E.E. in 1892 from Pennsylvania State College and took graduate work at Columbia University. He was among the last of the group known as the "utility fathers."

Pvt. Harold McFadden, 26, Bradford, Pa., a pumper for South Penn Oil Co. when he entered war service in August 1944, was killed in action in Germany April 16.

Charles H. Calhoun, 64, for the past 20 years foreman of the Kendall Refining Co. machine shop at Bells Camp, Pa., died May 16.

Ralph A. Cavanaugh, 50, district manager for The Pennzoil Co. in Canton, Ohio, died May 16.

John D. Wrather, organizer and president of Overton Refining Co., Inc., died May 17 in Dallas. He was a pioneer operator in the East Texas field, and the first refineries at Kilgore and Overton were built by him.

David V. Shaw-Kennedy, 50, director and member of the executive committee of Elastic Stop Nut Corp. of America and American Gas Accumulator Co., died May 12 at his summer home in Narragansett, R. I.

Miss Mary Spear, 66, probably known by more old-time natural-gas men than any other person, died April 23 in East Orange, N. J. Miss Spear was in charge of membership records for American Gas Association until shortly before she retired March 1, 1944. She joined Natural Gas Association of America in 1919 as librarian at its Pittsburgh headquarters.

M. C. Carter, 94, believed to have been the oldest working geologist in the United States, died May 14 in Wichita Falls, Tex. Carter became interested in geology before the Civil War while in Tennessee, where he was born, and it was his occupation more than 65 years. He spotted hundreds of wells in Texas and Oklahoma and 24 new pools. He was instrumental in developing the Fowler well, which started the Burkburnett boom.

ELECTRIC WELD LINE PIPE TO YOUR SPECIFICATIONS!

WHEN you install Youngstown Electric Weld, for oil, gas, water, or other purposes, you know you are getting the type of Line Pipe that is performing satisfactorily in thousands of miles of service. It is processed with unusual care throughout manufacturing operations, closely controlled at every step...each length is hydrostatically tested, each lot is physically tested, each piece is carefully inspected...to meet known field requirements. It is available in sizes from 6⅝" O.D. to 20" O.D.

Before you design your next pipe line, consult us. Our Engineering and Metallurgical staffs are ready to work with you to take care of your individual pressure requirements and special service conditions. That's why in Youngstown Electric Weld, you get line pipe to meet your toughest needs, dependably, and to your full satisfaction, whether for war or peace requirements.

QUALITY YOUNGSTOWN SERVICE

YOUNGSTOWN
ELECTRIC WELD LINE PIPE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN 1, OHIO

Manufacturers of
CARBON ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit Bars Coke Tin Plate Electrolytic Tin Plate-Rods-Wire-Nails-Tie Plates and Spikes

Fig. 1—Map showing location of several Gulf operating areas where floating equipment is used

Fig. 2—Workover barge rig recently located at 2 Gulf-Tide Water, in the West Bay area

Fully Equipped Floating Tank Batteries Used in Coastal Louisiana Operations

by E. H. Short, Jr.

The floating tank batteries here described are the first of the kind to be used on the Gulf Coast. Advantages are elimination of piling, and reduction in time ordinarily required to place the conventional tank battery in operation. There are six such floating tank batteries in operation now, varying from 120 to 180 ft. in length.

PERHAPS the most recent contribution toward the ever-increasing efficiency of marine operations are Gulf Refining Co.'s floating tank batteries and heater-treater installations now in use in the delta region of Southern Louisiana.

West Bay Field

In the West Bay field, at the tip of the Mississippi delta, the Gulf company operates 20 flowing wells which produce from Miocene zones, at depths between 6,100 and 10,700 ft. Gulf holdings in this area consist of nine separate leases which have allowed production of approximately 3,500 bbl. of 33°-gravity oil per day. Wells are completed with 2-in. and 2½-in. tubing and well-head pressures vary between 200 and 4,000 psi.

Currently, one drilling unit and a workover rig are kept in operation at all times. The workover unit (Fig. 2) was recently located at 2 Gulf-Tide Water, which had gone to salt water. The standard procedure of workover in this field involves filling the tubing with 10.5-lb. mud having a viscosity of 42. It is then pulled and a rock bit run and rotated while washing to remove the accumulated sand. With a packer on bottom of the 2-in. tubing, a squeeze-cement job is performed on the producing zone. After drilling out, new perforations are made at different points in the same zone.

The pipe-line system in this field consists of 6-in. gathering lines and the pump station is equipped with 3-in. rotary pumps driven by three

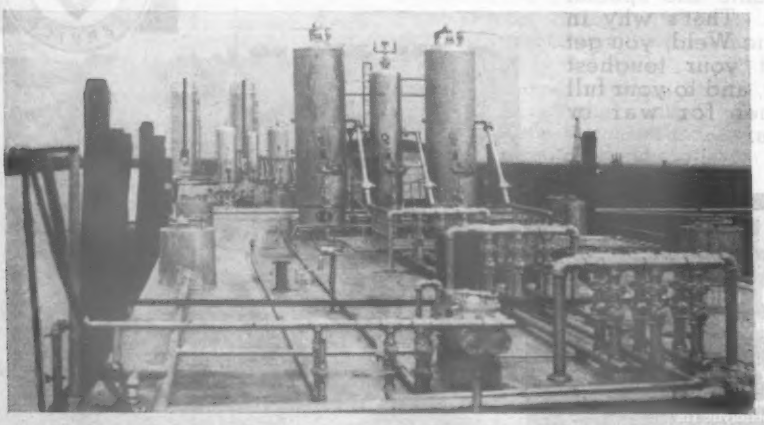


Fig. 3—Auxiliary tank-battery equipment installed on deck. Vent lines on deck

25-hp. gas engines. Gas for drilling and lease operations is furnished through a gas-gathering system consisting of 2½-in., 3-in., and 4-in. lines.

Grand Bay Field

The Grand Bay field is east of Venice, La. In this field there are 37 flowing wells on 3 leases which produce a daily allowed production of 7,000 bbl. of 35°-gravity oil. There are seven producing zones in the field ranging in depth from 6,500 ft. to 10,000 ft. The wells in this area are equipped with 2-in. and 2½-in. tubing and surface pressures range from 150 to 3,000 psi.

Bully Camp Field

Bully Camp is located northwest of Gold Meadow. Boats depart to this field from a boat landing 8 miles northwest of town. This area is traversed by numerous Gulf-dredged canals. The standard width of these waterways is 90 ft., with a 7-ft. mean low-tide depth.

There are four wells in this field which flow a daily allowed production of around 800 bbl. from an approximate depth of 6,100 ft.

Floating Tank Batteries

The Gulf-designed floating tank batteries in operation on the above described properties are the first of the kind to be used on the Gulf Coast. However, with the advantages offered, it appears likely that similar installations will make an appearance in other coastal areas.

There are two principal advantages to be derived from the use of floating tank batteries, both of which may be subdivided. The elimination of piling necessary for conventional tank batteries is one advantage, and resulting from this is the reduction in time ordinarily required to place the conventional tank battery in operation. Where stationery tank batteries are to be used, construction work is not usually begun until after a favorable electric log has been taken. If everything is in complete readiness, the erection of the conventional tank battery requires 4 or 5 days.

Fig. 4—Gulf installation of heater treaters on barge

The six floating tank batteries now in operation vary somewhat in size. The largest is 180 ft. in length, 32 ft. in width, and 11 ft. in depth. The smallest size is 120 ft. long, 33 ft. wide, and 9 ft. deep. These floating tank batteries are converted cargo barges. Each barge is divided into six tanks or compartments which have a total oil-storage capacity of approximately 4,500 bbl. The manifold system has been designed so that each barge can be divided into three separate tank batteries, each consisting of two tankes.

These tank batteries are fabricated at Harvey, La., and upon completion are subjected to an exhaustive inspection to eliminate the possibility of having to do any welding after the tanks have been placed in operation. Should it become necessary to weld a tank battery in the field, elaborate safety precautions, at a cost of several hundred dollars, must be observed. This involves cleaning the tanks and circulating steam until the air in the tanks passes a test made by a certified chemist. In connection with safety, all hand tools used on Gulf tank batteries are made of sparkproof alloy steel.

Complete portability of the floating tank battery has an all-inclusive meaning. When a tank battery is towed to location, all auxiliary equipment is in place from circulating pump to separators, so that the only work necessary for placing the battery in operation involves hooking on to the lead lines. Marine specifications for barges will not permit protrusion of auxiliary members past the edge of the barge. Therefore all lines from the separators are flanged at the edge of the barges. If lead lines have been laid to the

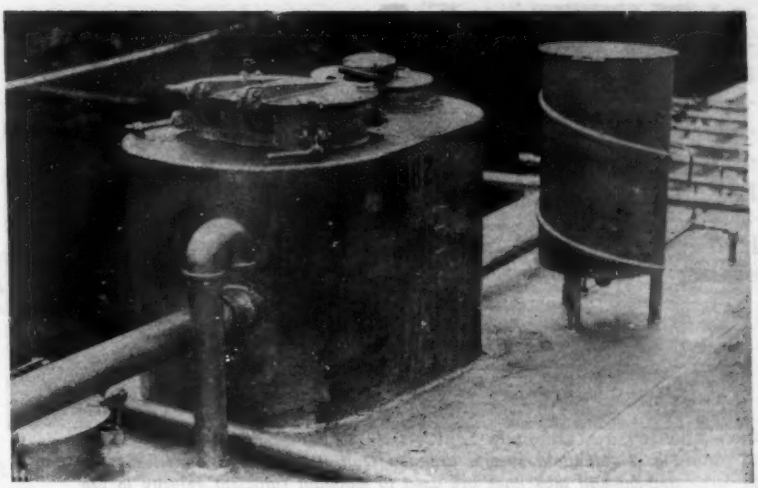


Fig. 5—Closeup of tie in of 4-in. vent. At right is individual sample barrel

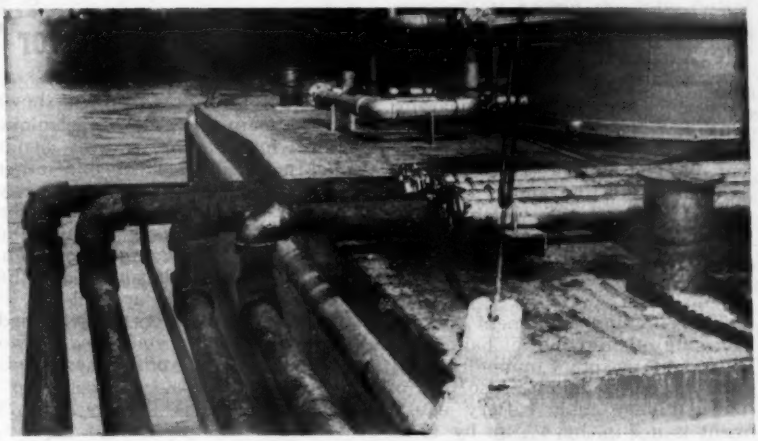


Fig. 6—Closeup showing heater-treater deck and flanged inlets

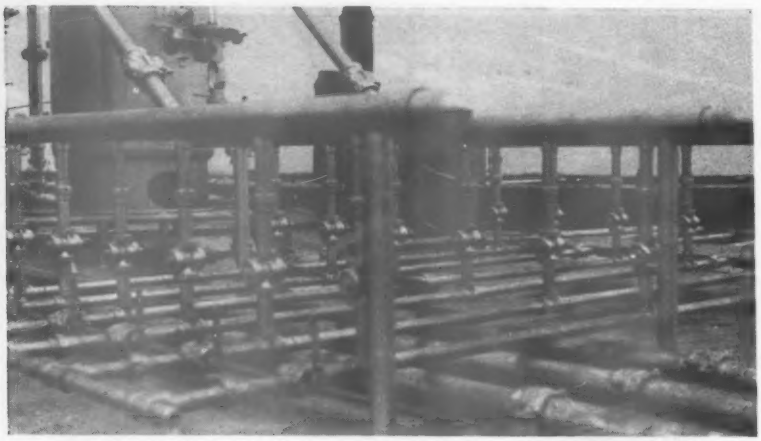


Fig. 7—Manifold system used on Gulf floating tank batteries. One-and-one-half inch lines are used to maintain sufficient velocity to prevent formation of paraffin. Use of smaller lines also reduces cost

tank-battery location, it is a simple, quick matter to tie the wells in.

Each tank battery is equipped with two 125-lb. working pressure separators and one 500-lb. separator. One low-pressure separator is for handling clean oil and the other for cut oil. The high-pressure separator is used for testing and is equipped with a meter flange, which permits the changing of orifices without by-passing the gas. Each tank-battery barge is equipped with four fire extinguishers.

The pumping equipment for discharging oil into the oil barge consists of a 6-in. rotary pump driven by a 60-hp. diesel engine. Also part of the auxiliary tank battery equipment is a 7-in. by 4½-in. by 10-in. steam pump driven by gas pressure. The exhaust discharges into the vent lines. This pump is used for circulating tank bottoms and also for washing down the deck.

In referring to a closeup of a portion of the manifold system it will be noted that 1½-in. lines are used The use of this size maintains sufficient velocity to prevent the accumulation of paraffin.

The latest Gulf design of floating tank batteries has placed the vent line on the deck. This line also acts as an equalizer line and should any of the tanks fill while the pumper is detained on another lease the oil will start filling another tank through this line.

The floating heater treaters are as compact and well arranged as the floating tank batteries. The decks are constructed to withstand a load of approximately 220,000 lb. The ease in which these floating heater treaters can be quickly placed in operation is shown in an accompanying illustration. If the field has lines laid to the heater-treater location, it can be placed in operation quickly by simply flanging up the lines.

Cities Service Joint Owner Well No. 1 TXL

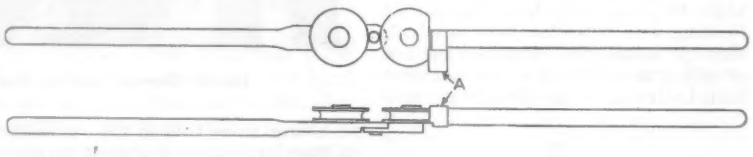
The name of Cities Service Oil Co., joint owner with Shell Oil Co., Inc., of 1 TXL, Ector County, West Texas, discovery well, was inadvertently dropped from Journalog 70 appearing on pages 155 and 156 of the May 19 issue. Cities Service and Shell drilled the well jointly and are equal partners in its operation.

Stuart Buckley, Humble Oil & Refining Co., addressed the student section of the A.I.M.E. at the University of Texas recently. His subject was "Production Research."

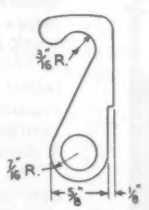
Bending Device for Tubing and Small Pipe

THE accompanying drawing shows the main features of a unique device for making smooth bends quickly in small steel and other tubing or small piping, which may be adapted to any type of tube, the bending of which is within the strength of the average workman. The device was developed at the Toledo refinery of Pure Oil Co.

Two grooved rollers are attached by means of heavy steel pins to two cold-rolled steel rods. These rods are connected by heavy pins and a link at such distance that the rollers are about ¼ in. apart. The tube hook is attached as shown by a "collar" hole on the rod which holds the stationary collar. The link is attached to the stationary roller rod on the same shaft or pin as that which supports the roller. The other end of the link is attached by a heavy pin to the end of the rod carrying the moving roller, that portion of that rod extending beyond the roller, as shown. The exact lengths and proportions of these different dimensions are determined by the size of tubing for which the device is designed. A segment of the stationary roller is cut away as shown to permit the close attachment of the hook.



DETAIL A



The rollers are grooved to the diameter of the tubing to be bent, but the groove is much deeper than the outside radius of the tubing; this groove is made by cutting a slot with parallel walls in the face of the roller and finishing this slot off on a semicircular cross-section which has the same outside diameter as the tubing. This groove is so made to prevent the tube flattening when bent, by supporting the sides which are at right angles to the plane of the bend. This prevents these sides from spreading under the bending stress and leaves a bend which is practically round.

To make a bend, the straight tube is placed with one end under the hook, and the tube resting in the groove of the stationary roller, and the movable roller rod pulled around to the outside of the bend as it will be when finished. The tube is rested in the groove of the movable roller and the rod carrying that roller is pulled around, rolling the tube into the groove of the fixed or stationary roller, unless the desired angle of bend is attained. Where a number of bends are to be made recurrently for a number of different sizes of tubing, a series of these benders may be made up, one for each size of tubing or pipe.

ELECTRONICS —Its Application to Petroleum Technology

by Fabian R. Staley

PART 2

"That the future of electronic instrumentation is secure is attested to by its rapid growth to prominence. Its future applications will become more diverse as time goes on, being limited only by the ingenuity of man to conceive and devise new jobs to be done."

H. D. Middel
General Electric Co.

THE ability of an electron tube to perform a specific function is determined by its characteristics, the numerical values of which depend upon the construction of the tube, and upon electrode voltages and currents. The effects of direct-current voltages applied to the electrodes are called static characteristics, and the effect of grid voltage on the anode current is called the mutual or transfer characteristic. The plate or anode characteristic is the relation between anode current and anode voltage. A family of curves showing these relations for various grid voltages is very useful in circuit design for amplifiers. The equivalent circuit of a triode is a voltage source in series with a resistance. This holds only for the linear range of the tube, where the volt-ampere curves are straight lines. The amplification factor, or MU, is the ratio of the change of anode voltage to the change of grid voltage, at constant anode current. It represents the maximum voltage amplification available in a given tube. If the grid's mesh is coarse the amplification factor tends to be low, since a higher percentage of electrons can pass it with relatively little grid control, while in the case of a fine-mesh grid the electrons are influenced to a greater degree, therefore the amplification factor tends to be high. Also the farther the grid is removed from the cathode, which is the source of electron emission, the less effective is its control; consequently the higher the tube's MU. The distance is limited by mechanical strength and required insulation. The range of MU generally varies from about 3 to about 200 for triodes, and to above 1,500 for pentodes. Tubes can be arranged so that the output circuit of one feeds into the grid of the next, which increases the amplifying effect. Variable MU tubes use a grid that is coarse near the center, and fine at the top and bottom.

Transconductance is the ratio of the change of anode current to the change of grid voltage at constant anode voltage, and it is usually expressed in micromhos. It is the most important characteristic of a tube, and is a direct measure of its amplifying properties. Most tubes have a transconductance of from 1,000 to 3,000 micromhos, but some run higher. Transconductance may be determined graphically from the slope of the mutual characteristic curve of the tube or by direct measurement in a circuit when many readings are required. In some applications the triode has two important drawbacks. One is that the electric field of the anode penetrates the grid so that the anode current depends partly on the grid voltage, which is undesirable. The other disadvantage occurs in certain radio-frequency circuits where the capacitance between the grid and plate causes trouble. To overcome these conditions a second grid called a screen grid is placed between the anode and the control grid. The screen-grid tube is called a tetrode. Its four elements are cathode, control grid, screen grid, and anode or plate. This tube was successful in providing the low capacity desired but on account of secondary-emission effects within the tube distortions of plate characteristics result. These detrimental effects are overcome in the pentode by the addition of the suppressor grid between screen grid and plate. The pentode has superseded the tetrode in all but a few applications.

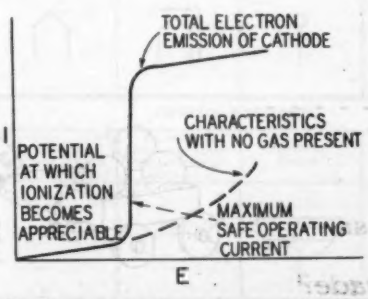


Fig. 1—Current-voltage characteristics of a gas diode

Equivalent circuits for tetrodes and pentodes can be obtained by the same method used for the triode. They usually have a higher amplification factor and a higher dynamic plate resistance. For the largest power sizes of vacuum tubes, requiring high anode voltages and currents, the triode is generally used because of its simplicity and its ruggedness.

Beam Power Tube

The beam power tube is a tetrode in which the effect of a suppressor grid is achieved by a design that causes the mutual repulsion between the electrons in the screen-grid-plate region to depress the potential. The electrons move in a sheetlike beam, so that electron density is increased. The distinguishing features of the tube are that the anode current rises very rapidly with anode voltage at low anode voltage, and then flattens sharply. Except at very low currents there is no secondary emission. The screen current decreases with increasing anode voltage, and is relatively small in magnitude. Its characteristics are similar to those of the pentode, and because of its higher efficiency due to smaller screen-current requirements, it is used in low-power amplifiers and transmitters.

For ultra-high-frequency applications special tubes are designed. The types include the triode, pentode, and beam for receiving tubes; and similar types for power tubes. The larger ones are water or forced-air cooled.

The equivalent electric circuit

The Evolution of

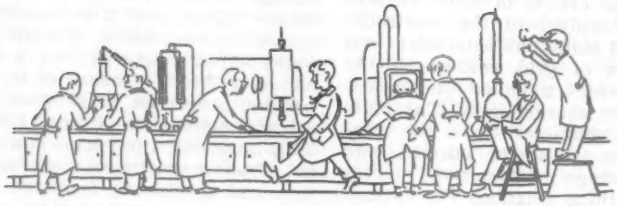
IDEA - - - - -

Discovery - - - - -

RESEARCH

Busy

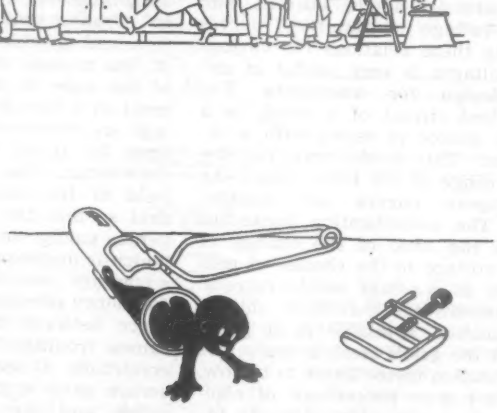
Laboratory



TEST TUBE BABY

Laboratory

Offspring

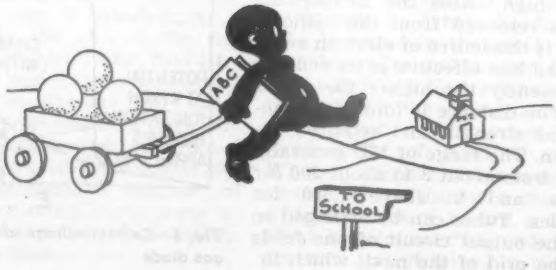


SCHOOL DAYS - - - - -

The Pilot Plant

Can the Process

Make the Grade?



method of solving a problem of power-system behavior consists in setting up on a direct-current calculating board, alternating current network, or on the transient analyzer, and then reading the desired characteristics on electric instruments. The effects of any change in the system can be quickly and accurately determined by changing one or more circuit elements. This method can be applied to circuits representing the mechanical and hydraulic elements of the system, and separate "hunting circuits" to represent the system behavior in oscillatory transients. It is also possible to represent both elastic and electromagnetic field equations by equivalent circuits. These relatively rapid and exact circuit measurements replace tedious mathematical computation or laborious experimentation. Radiation from antennas, propagation through wave guides, cavity resonators of arbitrary shapes, eddy currents in conductors, and forces exerted on current-carrying structures may all be determined by these methods.

Determination of Vacuum Tube Constants

The principal constants of a vacuum tube are the amplification factor, the plate resistance, and transconductance. In screen-grid, beam, and pentode tubes, the MU factor of the screen relative to the control grid with respect to the total space current, and also the dynamic resistance of the screen-grid circuit are important. A rough determination of tube constants can be deduced from the characteristic curves. The method is unsatisfactory in the case of the plate resistance and amplification factor of pentode and similar tubes, since these values are so high that the required ratio cannot be evaluated from ordinary characteristic curves with accuracy.

An experimental method of determining constants from increments is often used for approximate determination. Thus to obtain the transconductance, the control-grid voltage would be increased by an increment, that would be evaluated by the grid voltmeter, and the resulting change in plate current could be observed on the plate millimeter. The amplification factor would be obtained by adding an increment to the grid voltage as above, and then changing the plate voltage by the necessary increment required to leave the plate current unchanged, as indicated by a plate millimeter. A high degree of accuracy is not possible because the very small increments necessary cannot be read accurately.

The most accurate method of determining tube coefficients involves the use of small alternating current and voltage, with a circuit arrangement that permits evaluation of the coefficients by a null balance.

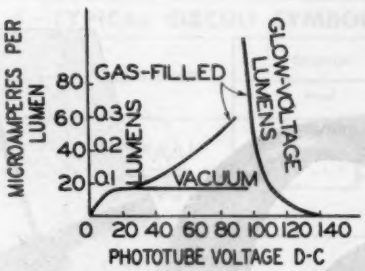


Fig. 2—Voltage-current characteristics of phototubes

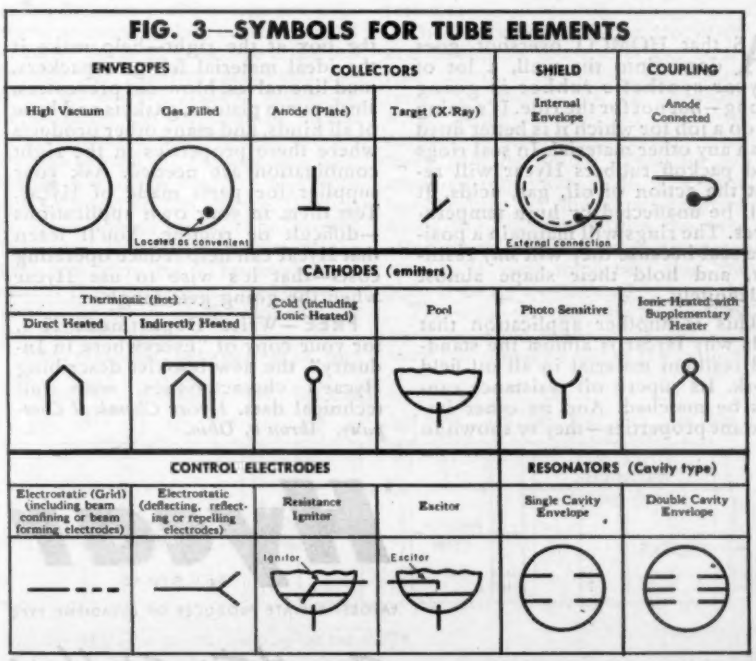
Gas-Filled Tubes

These tubes, after evacuation, are filled to a low pressure with an inert gas such as argon, neon, or krypton, or with mercury vapor. There are two principal classes, the hot cathode which emits electrons in sufficient quantity to carry the current, and the cold cathode with a self-sustaining gas discharge. A hot-cathode gaseous rectifier tube is an ordinary tube containing gas or vapor. The pressure is usually low. When the voltage is first applied the current-voltage relations are like those in a vacuum diode, since the current flow consists only of electrons emitted from the cathode. As the anode potential is increased, the electrons acquire enough energy to ionize the particles of gas by collision. The current that was formerly limited by the negative space charge of the electrons now has the space charge annulled by the positive ions, and the current rises very rapidly to full electron emission. The current-voltage relationship is shown in Fig. 1.

When ionization occurs in the tube a region between cathode and plate, called the plasma, is formed, and it contains positive ions that are approximately in equilibrium with the negative electrons that are drifting through the plasma to the plate. Most of the current in the plasma is carried by the electrons through a relatively stationary atmosphere of positive ions, thus conduction in the plasma is much like conduction in metals. The ionization of the gas and the building of the plasma require time, about 10 microseconds, as does the plasma to deionize which requires about 1,000 microseconds. For this reason the gas-filled tube, unlike the vacuum tube, is limited to the rectification of alternating current frequencies of only a few hundred cycles.

In the use of hot-cathode gas rectifier tubes certain factors must be considered. Every tube has a rated maximum average current that is appreciably less than the peak instantaneous current; this should not be exceeded, otherwise the life of the tube would be greatly shortened due to overheating. The allowable peak instantaneous current must be safely below the emitting possibilities of the cathode so that the instantaneous voltage drop in the tube will never exceed the ionization voltage. The maximum inverse voltage applied to the anode must not be

FIG. 3—SYMBOLS FOR TUBE ELEMENTS



These circuit symbols indicate differences between industrial and radio practice. Symbols that are the same for both are not shown here.

OIL FIELD FISHERMAN

and Hycar helps him land the big ones

Photo courtesy Houston Oil Field Material Co. *Hycar parts by Murray Rubber Co.*

AS that HOMCO overshot goes down into the well, a lot of Hycar synthetic rubber is going along—but not for the ride. It's going to do a job for which it is better fitted than any other material. In seal rings and packoff rubbers Hycar will resist the action of oil, gas, acids. It will be unaffected by high temperatures. The rings will maintain a positive seal because they will *stay* resilient, and hold their shape almost indefinitely.

This is another application that tells why Hycar is almost the standard resilient material in all oil field work. Its superb oil resistance cannot be matched. And its other important properties—they're shown in the box at the right—help make it the ideal material for gate packers, mud line valves, blow-out preventers, slush pump pistons, gaskets and hose of all kinds, and many other products where these properties in the right combination are needed. Ask your supplier for parts made of Hycar. Test them in your own applications—difficult or routine. You'll learn that Hycar can help reduce operating costs—that it's wise to use Hycar when the going gets tough.

FREE—Write Department K-4, for your copy of "Everywhere in Industry", the new booklet describing Hycar's characteristics, with full technical data. *Hycar Chemical Company, Akron 8, Ohio.*

WHAT HYCAR DOES IN OIL FIELD APPLICATIONS

1. *Resists oil and gas—even under high pressures and temperatures.*
2. *Resists action of abrasive-laden fluid under high pressure and at high velocity.*
3. *Wears at slow rate even under worst conditions.*
4. *Makes a positive, leak-proof seal, even after a long period of service.*
5. *Provides high elasticity.*
6. *Gives high tensile strength.*
7. *Has minimum tendency to cold flow and compression set.*

Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubbers

FIG. 4—TYPICAL CIRCUIT SYMBOLS

Device	REACTOR		TRANSFORMER	RESISTOR	POTENTIOMETER	DRY DISK OR METAL RECTIFIER
	Iron Core	Air Core		Fixed	Variable	
Industrial Symbol	Reactor *L1	Reactor *L1	T*1	R*1	P*1	Rectox *D1
Radio Symbol	L1	L1	T1	R1	R1	RX1

Device	CAPACITOR		RELAY CONTACT				RELAY COIL
	Fixed	Variable	Contact Open when De-energized	Contact Closed when De-energized	Interlock Open when De-energized	Interlock Closed when De-energized	
Industrial Symbol	C*1	C*1	CR1	CR1	CR1	CR1	CR1
Radio Symbol	C1	C1	K1	K1	K1	K1	K

The above symbols represent specific functions of tube elements. When two or more functions are combined in one element (such as a dynode, used in multiplier-type phototubes) the symbols are combined like this: ⊥. All symbols can be used in an unlimited variety of combinations for complete tubes.

high enough to cause arc-back. Hot-cathode mercury-vapor rectifier tubes must be operated so that the temperature of the condensed mercury falls between definite limits. Since cathode emission, and not space charge, limits the current that a gas rectifier can pass, it is desirable to obtain a maximum emission per watt of cathode heating power. Cathode structures are used that cannot be used in vacuum tubes.

Because of their current-voltage characteristics gas-filled tubes cannot be connected directly in parallel. The operating part of the curve is so steep that a slight difference in the characteristics of two tubes would make a great difference in the current taken by the tubes, and nearly all the current would be taken by the one with the smaller voltage drop.

The grid-controlled gas rectifier tube, the thyratron, is a hot-cathode gas tube in which there is inserted a control electrode between the cathode and plate. The characteristics associated with the grid control are such that if the grid is considerably more negative than the cutoff value (voltage at which no electrons are attracted to anode), and then is gradually reduced, it is found that at the point where plate current would just start to flow if the gas were not present, the plate current suddenly jumps from zero to a high value, because positive ions are produced as soon as plate current begins to flow. Some of these are attracted toward the negative grid, and destroy its normal control action by neutralizing the electrostatic effect. Simultaneously positive ions are attracted toward the cathode and neutralize the space charge. Therefore when ionization has started, there is no space charge to limit the current flow, and the control action of the grid has been lost. The anode current is then determined by the same factors as those of the hot-cathode gas rectifier tube.

The relations between grid and plate potential at the moment of the initiation of the arc are similar to those of a vacuum triode at cutoff. The starting voltage characteristics of a thyratron is that the ratio of the positive plate potential to negative grid potential is nearly constant, and this ratio is called the control ratio. Because of the possibility of large grid currents it must be protected in circuits by a series resistor.

The limitations of the thyratron are similar to those of a gas rectifier. There is a certain peak current that should not be exceeded even instantaneously so that the cathode is not disintegrated. Also, there is a maximum allowable average current value upon which the temperature of the tube depends. Since the pressure within the tube rises sharply with rise in temperature it is very important that the tube is never overheated.

The cold-cathode diode contains neon or some other inert gas at a very low pressure. Since the cathode

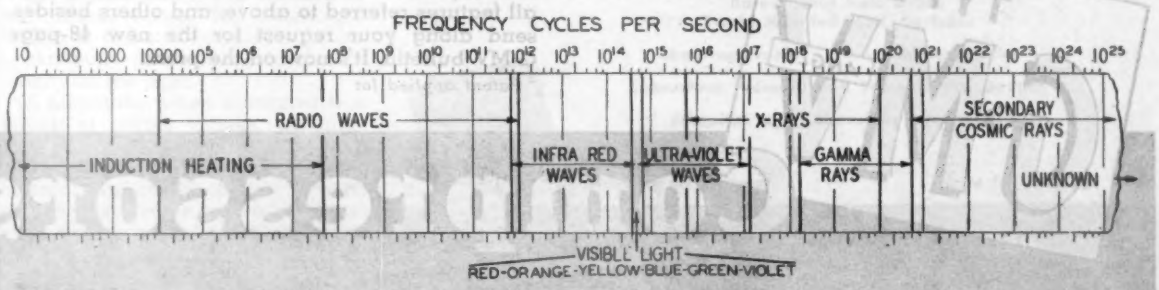

FREQUENCY CYCLES PER SECOND
10 100 1000 10,000 10^5 10^6 10^7 10^8 10^9 10^10 10^11 10^12 10^13 10^14 10^15 10^16 10^17 10^18 10^19 10^20 10^21 10^22 10^23 10^24 10^25
RADIO WAVES
INDUCTION HEATING
INFRA RED WAVES
ULTRA-VIOLET WAVES
X-RAYS
GAMMA RAYS
SECONDARY COSMIC RAYS
UNKNOWN
VISIBLE LIGHT
RED-ORANGE-YELLOW-BLUE-GREEN-VIOLET

Fig. 5—Electromagnetic radiation

December marked the beginning of the second half year of 100 octane gasoline production for Continental Oil Company's new Oklahoma plant where 2,000 G-MV compressor horsepower serve the Thermofor catalytic cracking units in this complete and very modern plant.

Cooper-Bessemer's efficient G-MV's are found holding steadfastly to production schedules in every kind of compressor service. But here are just four of the important reasons why they are so practical and effective for the production of aviation gasoline and for refinery service in general:

1. VERSATILITY ... G-MV compressor cylinders are available in a wide variety of types and sizes for compressing air or any gas, and permitting any combination of volumes and pressures within the engine's rating. Every crankthrow is available for driving a compressor cylinder, if desired, affording extreme flexibility and latitude in application.

2. COMPACTNESS ... In the G-MV, 2-cycle operation is combined with V-type design to provide an unusually low space-to-horsepower ratio despite conservative speed. Built in 400, 600, 800 and 1000 hp sizes, unit length averages only 4' 2" for each 200 horsepower — a decided advantage particularly in plants requiring a high total horsepower.

3. RESPONSIVENESS ... G-MV's are noted for their smooth operation and sensitive response to control — the result of Cooper-Bessemer's precise "Silent-Scot" fuel injection, "Streamlined" scavenging and correctly selected ignition, combined with inherent freedom from vibration and advanced "uniplane" design. Thus the most exacting demands can be met ideally and economically.

4. AUTOMATIC CONTROL ... Due to their unusual versatility and responsiveness, G-MV units are especially suited to automatic control — a special phase of engineering highly developed by Cooper-Bessemer. In fact Cooper-Bessemer now offers a unique, fully proved system of interposing speed control between successive steps of unloading * to give a straightline control over virtually 100% demand, thus extending the advantages of speed control far below the limits previously practical with automatic control.

For detailed and profusely illustrated data on all features referred to above, and others besides, send along your request for the new 48-page G-MV bulletin. It's now on the press.

** Patent applied for*

TYPE G·MV ANGLE **Compressors**

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.

is cold, the voltage drop is high, and the current density in the discharge is low. The voltage drop is determined by the gas pressure and the cathode material. The tubes are operated in the part of the characteristic in which the voltage drop is nearly constant. If this voltage drop is exceeded the tube may be damaged. The principal uses of these tubes are as voltage regulators, stroboscopic light sources, relaxation oscillators, polarity indicators, and surge-protection devices.

The cold-cathode gas triode is useful for controlling relays or other applications where it is desirable to keep power consumption low during long standby periods. Two fundamental principles are utilized in the tube operation; the breakdown potential between two electrodes depends upon their spacing, and it is lowered when ionization is present. Ionization is provided between the cathode and a starter electrode placed close to it. The starter electrode is operated with a high resistance in series so that it carries very little current. The tube has a definite life, determined by the rate at which the metal deposited on the cathode is used up. The tubes are designed to operate at low currents, and the circuits should be arranged so that the anode current flows as little as possible.

Phototubes

The requirement for the emission of an electron is that the electron shall obtain sufficient energy to pass the potential barrier at the surface of the cathode. In a thermionic tube this energy is supplied by the temperature of the cathode. Light, especially of short wave length, can supply energy to electrons that will give them sufficient velocity to cross the surface potential barrier for emission. The phenomenon is called photoelectric emission. The first law of such emission is that for a given type of surface, no emission will occur regardless of the intensity of the light, unless the wave length is below a certain maximum, called the threshold. Some metals, such as zinc, will not emit unless the wave length is as short as the ultra-violet. Potassium will respond to daylight, while cesium oxide will respond in the infrared range. The second law is that if there is emission it is approximately proportional to the intensity of the light.

A phototube, when connected to a circuit of proper voltage, will permit a current to flow whenever the tube is illuminated. It usually consists of an anode and a cathode sealed in a vacuum or in a low-pressure gas space. Tubes can be made that are sensitive to ultraviolet or to infrared light by the proper combination of factors affecting characteristics. They are usually made to have a high sensitivity throughout the visible spectrum and reaching into the infrared. Most practical light sources have a large proportion of their total energy output in the red end of the spectrum. A tube having the desired response can be built either as a vacuum or gas filled. Phototube currents are usually very small, and in order to amplify these currents thermionic tubes may be used in the circuits.

Phototubes can be used with alternating current voltages. There is no reverse current at any except at destructive reverse voltages, and there is no current in the forward direction without light on the phototube.

Voltage-current characteristics of a vacuum and a gas-filled phototube are shown in Fig. 2.

Circuit Components

A pure resistance is the simplest circuit component. The relationship between voltage (V), current (I), and resistance (R) is expressed by Ohm's law:

$$V = IR$$

The electrical energy entering a resistor is immediately turned into heat and dissipated. In pure resistance the form of the current wave follows that of the voltage instantly and exactly. Any resistor which has a volt-ampere curve which is not a straight line is called a nonlinear re-

EQUIPMENT IN WORLD-WIDE USE

Petroleum Exploration is NO Longer

E.L.I. Reflection Seismograph Equipment

Automatic Amplitude Control for Clear, Balanced Records on FIRST Recording.

Portable and Truck Mounted,
12, 16 and 24 Trace Recording Oscillographs

Rotary Shot Hole Drills,
Truck Mounted and Portable

Shooting Trucks Water Trucks

Subsurface Pressure and Temperature Gauges

Samplers and Laboratory Equipment

Brochure on Request Write for Catalogs

Engineering Laboratories, Inc.

CONSULTING ENGINEERS & MANUFACTURERS

602-624 East Fourth Street Tulsa 3, Oklahoma, U. S. A.

sistor, and Ohm's law does not apply. All resistors show some slight inductive and capacity effects, but they are negligible at the frequencies found in industrial use. The size and shape of resistors vary widely, depending upon the heat to be dissipated and the number of ohms.

Capacitors, formerly called condensers, consist essentially of two sheets of a conducting material separated by a layer of an insulator, or dielectric. If a battery is connected to apply a potential between the two plates, the electrostatic field set up will tend to create a strain in the dielectric; if the strain is too great, the dielectric will be ruptured and an arc will jump between the plates. The electrostatic field is produced by the flow of electrons from the positive plate to the negative plate; this current is called the charging current. If the battery is then removed, the dielectric will remain stressed, and the potential between the plates will remain at battery potential.

The energy stored in the capacitor is equal to the product of the battery voltage and the ampere-seconds of the charging current that flowed. If the insulation of the dielectric were perfect, the energy might be kept stored in this state for an indefinite time.

If the application of voltage or the discharge is made suddenly through a circuit of low impedance, very high currents may flow. If the potential source is such that the voltage applied to the capacitor is changed slowly and smoothly, as from a sine-wave alternating-current voltage, the charging and discharging currents will be proportional to the rate of change of voltage. When circuits are completed quickly, as when a thyratron or ignitron is fired, a large current may flow due to the rapid rise in voltage. The energy stored in the capacitor is proportional to the product of the square of the voltage between the plates and a term called the capacity, and it is expressed in farads. A condenser has a capacitance of one farad when one coulomb of electricity can be added to it by an applied voltage of one volt. This unit is too large for practical use, and the microfarad (one-millionth farad) is usually used. The high efficiency of a capacitor is shown by its ability to return a high percentage of the energy stored in it instantly. The availability of the energy as a high electric voltage is quite useful. Another advantage is its apparent ability to permit the transmission of a surging and receding alternating current by holding back the flow of a direct current. This is important in amplifier circuits. Since the capacity depends upon the nearness of the two plates, a very thin dielectric is sandwiched between the parallel plates in the construction of capacitors.

An inductance is a device that stores energy given in the form of an electric current. The capacitor stores the energy in the form of stress in the dielectric, and an inductance stores energy in its magnetic field. Energy is added or subtracted by a change of voltage across the capacitor, and in the case of inductance energy is added or subtracted to change the current flowing in the magnetic circuit. The capacitor can retain its charge for a long time, but the inductance can retain its charge for only a few seconds at most. If the resistance of the circuit could be neglected, the current would continue to flow indefinitely in a closed inductive circuit without the application of any potential. When a potential is applied the current will increase proportionally to the added potential. This gives a measure of inductance. In a circuit containing inductance only, if the application of one volt of potential causes the current to rise at the rate of one ampere a second, the circuit has an inductance of one henry. The microhenry is a millionth of a henry. Every electric circuit has some inductance.

In the case of the capacitor the microfarad capacity as well as the safe voltage that may be applied without breakdown is specified.

THAT'S WHAT THEY'RE BUILT FOR!

AMERICAN FULL ROLLER BEARINGS are made to exacting bearing requirements demanding the utmost in strength, durability and smooth, continuous performance under gruelling and abusive operating conditions. AMERICAN FULL ROLLER BEARINGS are carefully engineered, service-proven, time-tested. They are specially designed for extra heavy duty service and guaranteed to give flawless, trouble-free performance under the most severe strains and stresses encountered in the operation of modern heavy industrial machinery and equipment. Because they are built to outlast the equipment itself, few AMERICANS have ever failed in service.

Consult AMERICAN engineers on your next full-roller application.

AMERICAN ROLLER BEARING COMPANY
PITTSBURGH PENNSYLVANIA
Pacific Coast Office: 1718 S. Flower Street, Los Angeles, California

AMERICAN
HEAVY-DUTY
ROLLER BEARINGS

Likewise in the case of an inductance the henrys and the safe current are specified, although the current is not limited only by the inductive storage of energy but also by the heating of the conductors due to their resistance. The short-time current rating of an inductance may be considerably higher than its continuous rating. The size and shape of inductances, or reactors, vary greatly. For the lower frequencies (up to 500,000 cycles) iron cores are used to provide a more efficient magnetic path. The larger sizes are usually mounted in an oil bath for cooling and for insulation.

Transformers may be considered exactly as an inductance in circuit analysis. However, the voltage appearing across the secondary terminals must not be high enough to break down their insulation.

A battery acts like a capacitor of almost infinite capacity, but it is necessary to add to the theoretical capacitor some series resistance in order to duplicate more nearly the reaction of a battery.

The direct-current motor or generator has a generated voltage due to the rotation of its armatures, which tends to hold a constant potential at its terminals in spite of demands by the external circuit. This is a typical capacitor response. The armature circuit also has some resistance and inductance, which require the addition of a small resistance and inductance in series with the generated emf when its output is viewed from an external circuit.

The electronic tube has made possible the use of direct-current motors for most electronic control, and when used with tubes only the constant speed alternating-current motor is usually used. In such applications the tubes are employed merely as switches.

The simplest way of analyzing a circuit containing nonlinear elements is to consider them as resistances, the values of which must be obtained by step-to-step methods over the voltage or current range.

References

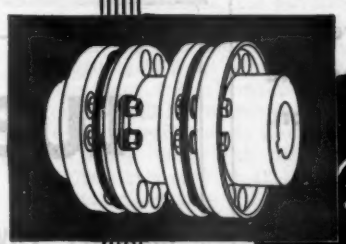
1. Timbie, W. H., and Vannevar Bush, "Principles of Electrical Engineering," John Wiley & Sons, Inc., New York, 1942.
2. Terman, F. E., "Radio Engineer's Handbook," McGraw-Hill Book Co., New York, 1943.
3. Henney, Keith, "The Radio Engineering Handbook," McGraw-Hill Book Co., New York, 3rd Ed., 1941.
4. Gulliksen, F. H., and E. H. Vedder, "Industrial Electronics," John Wiley & Sons, Inc., New York, 1935.
5. Hatschek, Paul, "Electron - Optics," Am. Photographic Publishing Co., Boston, Mass., 1944, translated by Arthur Palme.
6. Alger, P. L., and James Stokley, "Progress in Engineering Knowledge," General Electric Review, February 1945, page 9.
7. Cockrell, W. D., "Industrial Electronic Control," McGraw-Hill Book Co., New York, 1944.

National Instrument Society Formed

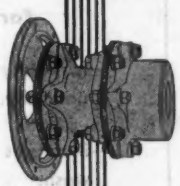
A new national society to be known as The Instrument Society of America was organized in Pittsburgh on April 28 at a conference attended by delegates from 15 measurement and control instrument societies that have been growing in different industrial centers throughout the country. The purpose of the society will be to advance the arts and sciences that are connected with the theory, design, manufacture and use of instruments. The society is nonprofessional, and offers membership to any person, firm or institution interested in the objectives of the society. Pro-tem officers were elected as follows: President, A. F. Sperry (Chicago); vice president, C. F. Kayan (New York); treasurer, C. E. Fry (Pittsburgh); secretary, Richard Rimbach (Pittsburgh). Various committees were also appointed to proceed with the organization work, and preparation of constitution and bylaws. The office of the secretary is the temporary office of the society and is located at 1117 Wolfendale Street, Pittsburgh 12.

T. S. Peterson, vice president and director of Standard Oil Co. of California, has been appointed assistant to the president.

THOMAS
Flexible COUPLINGS
FOR HOT OIL PUMP DRIVES or any other service where 100% Operating Efficiency is demanded



TYPE DBZ-C



TYPE CM

TYPE DBZ

THOMAS *Flexible* COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float . . . *and Eliminate* BACKLASH, FRICTION, WEAR and CROSS-PULL
NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

Write for Complete Engineering Catalog!

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

An Unusual EMPLOYMENT OPPORTUNITY

The world wide demand for Seismic Crews provided by Seismograph Service Corporation requires an immediate expansion of its technical personnel.

Men with training and experience particularly in Geology, Physics, Mathematics or Electronics, who will enter foreign service are offered an opportunity leading to responsible positions in petroleum exploration.

Applicants who qualify will be given training in SSC methods, and those who show promise may be sent to South America for further field experience, and when proved competent will be considered for assignments on seismic crews throughout the world.

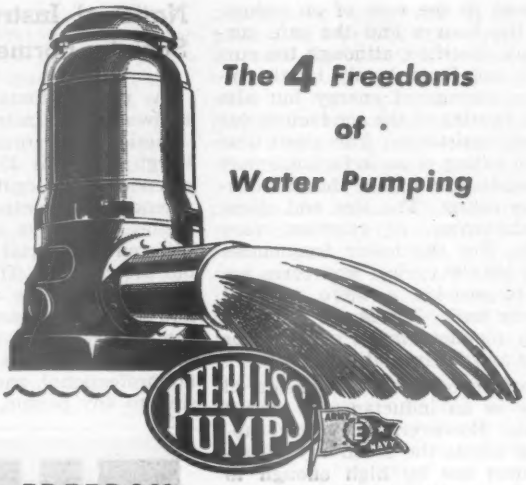
Applicants in the U. S. A. must comply with the regulations of the War Manpower Commission.

In writing for details as to training, salary, living allowances, etc., please state your qualifications and age.

Seismograph Service Corporation

Kennedy Building

TULSA, OKLAHOMA, U. S. A.



The 4 Freedoms of Water Pumping

FREEDOM—*from water shortage*
FREEDOM—*from excessive power bills*
FREEDOM—*from pump breakdowns*
FREEDOM—*from costly repairs*

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corporation

TURBINE
HI-LIFT
HYDRO-FOIL

301 W. Ave. 26, Los Angeles 31, Calif. • 1250 Camden Ave. S.W., Canton 6, Ohio • Other Factories: San Jose 5, Fresno 16, Calif.

LUBRI-GEL

(Patented)

HIGH GEL, LOW FILTRATE, ACID SOLUBLE

For completions, Lubri-Gel:

—Is nearly 100% acid soluble as it occurs naturally.

—Increases initial potential with a small acid wash.

—Eliminates messy oil "drill-ins."

—Has low natural filtrate—12cc for 30 minutes with 6% solution.

—Furnishes high viscosity where desired.

LUBRI-GEL PRODUCTS COMPANY

General Office • McCracken, Kansas

LUBRI-SAL • LUBRI-PLASTIC • LUBRI-WEIGHT • LUBRI-GEL

Displacement Factors

PART 28 IN A SERIES

*by Park J. Jones**

Other things equal, recoveries of oil by displacement with gas or water and recoveries of condensate by displacement with gas are proportional to displacement factors. A displacement factor is equal to the average value of the recoveries from the individual points within a region invaded by a displacing fluid. The path along which an interface between a displacing fluid and a reservoir fluid advances is called a displacement line. The recovery from points along a displacement line varies with distance from the source of a displacing fluid. For example, the recovery of oil or condensate from the points in the vicinity of an injection well is higher than from points more remote.

An equation is derived which enables us to estimate the recovery from any section (1) between the source of a displacing fluid and the position of an interface, and (2) between the source of a displacing fluid and any section for which the composition of the production is known. The procedure for estimating recoveries is illustrated by examples on displacement of condensate by dry gas and on displacement of oil by water.

Mechanics of Producing Oil, Condensate, and Natural Gas

Advancement of Interface for Constant Recovery

THE space occupied by 1 cu. ft. of injected gas is defined by

$$B = 0.0283\ TZ/P \text{ cu. ft. of space/cubic foot of gas} \qquad (1)$$

where

P = reservoir pressure, psia.
T = reservoir temperature, °R
Z = compressibility factor for injected gas.

If we assume that the injected gas is confined within 1 sq. ft. of cross-sectional area, the distance X in feet along which the interface between injected gas and a reservoir fluid will advance when V cu. ft. of gas are injected is defined by

$$X = \frac{0.0283VTZ}{Pfm(1-I)} \qquad (2)$$

where

f = porosity, fraction
I = interstitial water, fraction of porosity
m = average displacement factor over the distance X.

Equation 2 will now be illustrated by an example.

Example 1

How far will 1 M.c.f. of injected gas advance within 1 sq. ft. of cross-sectional area under the following conditions:

Reservoir temperature = 140° F. = 600° R.
Reservoir pressure = 2,000 psia.
Compressibility factor = 0.8
Porosity = 20 per cent
Interstitual water = 25 per cent
Displacement factor = 0.6.

Solution:

$$X = \frac{0.0283 \times 1 \times 600 \times 0.8}{2000 \times 0.2 \times 0.6 \times 0.75} = 75.5 \text{ ft.}$$

In this example, the advancement of the interface between the injected gas and the fluid being displaced is 75.5 ft. provided the displacement factor (m) averages 0.6 for the 75.5 ft. In reservoirs, the recoveries from points along the 75.5 ft. would vary with distance. The highest recovery is at the point of injection because all injected fluid passes through that section. The latest recovery is in the section reached by the interface. Recoveries from the sections in between vary progressively from the highest to the least recovery.

We will now derive an equation which enables us to estimate the recovery from any section (1) between the source of a displacing fluid and the position of an interface and (2) between the source of a displacing fluid and a section for which the composition of the production is known. The method to be used is

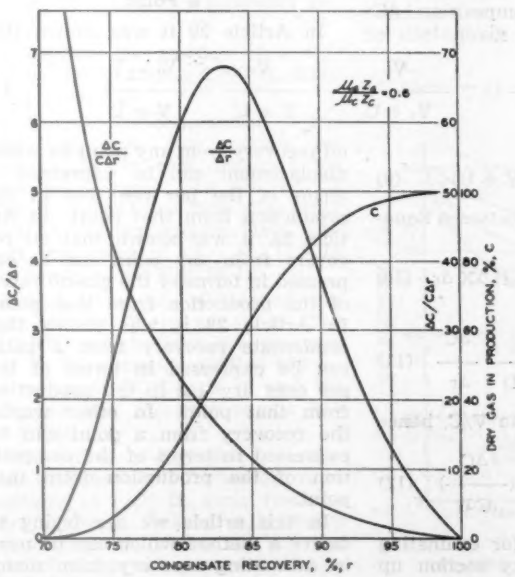


Fig. 21-1—(Left) Illustrating the basic data used for estimating the recovery of condensate from the region invaded by dry gas

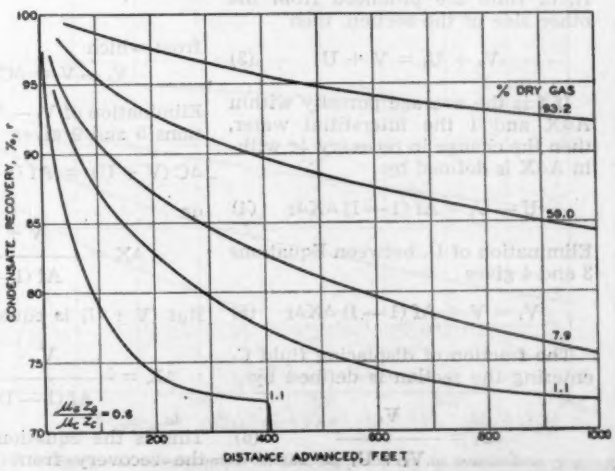
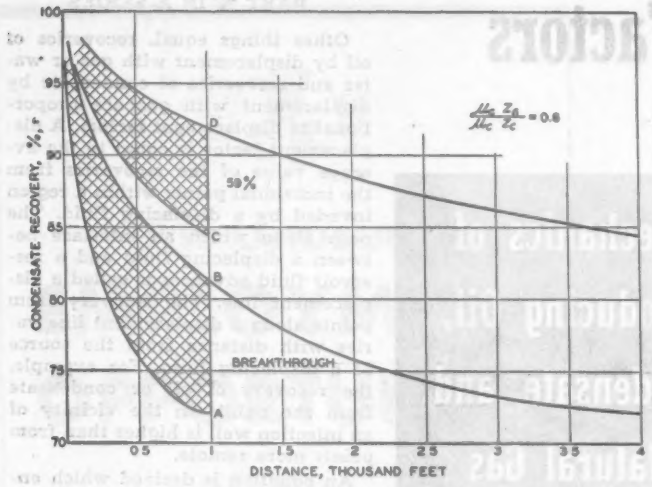
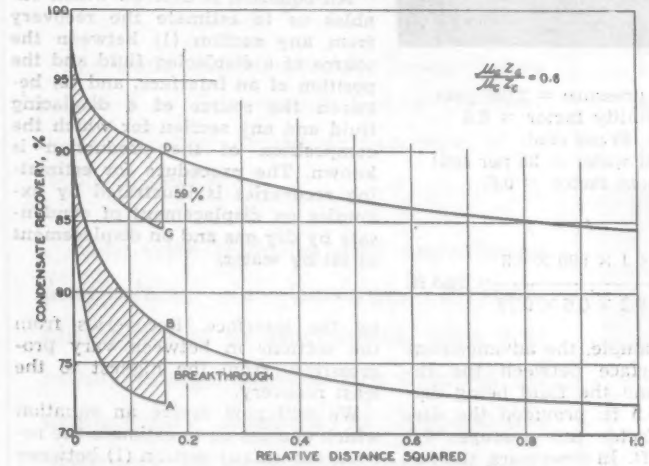


Fig. 21-2—(Below) Condensate recovery vs. advancement of per cent dry gas in production

*Production consultant, Houston.





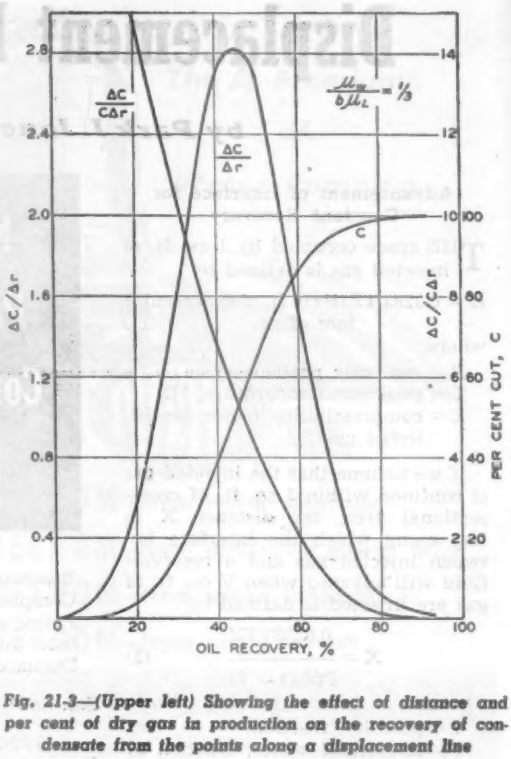


Fig. 21-3—(Upper left) Showing the effect of distance and per cent of dry gas in production on the recovery of condensate from the points along a displacement line

Fig. 21-4—(Left) Showing the effect of distance and per cent dry gas in production on recovery of condensate; unit distance equals 4,000 ft.

Fig. 21-5—(Above) Illustrating the basic data used for estimating oil recovery from regions invaded by water

based on the one proposed by Buckley and Leverett[1].

Advancement of Interface for Variable Recovery

Consider a cross-section having an area A sq. ft. and a thickness ΔX ft. Let V_1 cu. ft. of displacing fluid and U_1 cu. ft. of reservoir fluid enter one side of the section. If V + U cu. ft. of fluid are produced from the other side of the section, then

$$V_1 + U_1 = V + U \qquad (3)$$

If f is the average porosity within $A\Delta X$ and I the interstitial water, then the change in recovery Δr within $A\Delta X$ is defined by

$$U - U_1 = Af\,(1 - I)\,\Delta X \Delta r \qquad (4)$$

Elimination of U_1 between Equations 3 and 4 gives

$$V_1 = V + Af\,(1 - I)\,\Delta X \Delta r \qquad (5)$$

The fraction of displacing fluid C_1 entering the section is defined by

$$C_1 = \frac{V_1}{V_1 + U_1} \qquad (6)$$

and that leaving the section by

$$C = \frac{V}{V + U} \qquad (7)$$

The change in composition ΔC within the section is given by

$$\Delta C = C_1 - C = \frac{V_1}{V_1 + U_1} - \frac{V}{V + U} = \frac{V_1 - V}{V + U} \qquad (8)$$

from which

$$V_1 - V = \Delta C\,(V + U) \qquad (9)$$

Elimination of $V_1 - V$ between Equations 5 and 9 gives

$$\Delta C\,(V + U) = Af\,(1 - I)\,\Delta X\,\Delta r \qquad (10)$$

or

$$\Delta X = \frac{V + U}{Af\,(1 - I)} \frac{\Delta C}{\Delta r} \qquad (11)$$

But (V + U) is equal to V/C, hence

$$\Delta X = \frac{V}{Af\,(1 - I)} \left(\frac{\Delta C}{C \Delta r}\right) \qquad (12)$$

This is the equation for estimating the recovery from any section up stream from the position of an interface or from any section for which the composition of the production is known.

Recovery vs. Composition for a Point

In Article 20 it was shown that oil recovery from any point by water displacement can be expressed in terms of the per cent cut in the production from that point. In Article 22, it was shown that oil recovery from any point can be expressed in terms of the gas-oil ratios of the production from that point. In Article 28 it was shown that condensate recovery from a point can be expressed in terms of the per cent dry gas in the production from that point. In other words, the recovery from a point can be expressed in terms of the composition of the production from that point.

In this article we are trying to derive a method which can be used in estimating recovery from many

thousands of barrels of reservoir space or points. The first step is to apply Equation 12 and obtain the recovery from the points along a displacement line. The procedure for doing so will now be illustrated in terms of data on condensate recovery.

Condensate Recovery vs. Composition for a Point

The relationship between the recovery of condensate from a point and the composition of the production from that point is illustrated by the C curve in Fig. 29-1. The slope of the C curve is equal to the change ΔC in composition divided by the increase in recovery Δr. The curve denoted by $\Delta C/\Delta r$ illustrates the change in composition per unit increase in condensate recovery. The third curve in Fig. 29-1 gives the ratio of the change in composition per unit increase in recovery to composition. All three curves are point data. The product of viscosity and compressibility ratios is equal to 0.6. Fig. 29-1 illustrates the basic data used for estimating recovery of condensate from regions invaded by dry gas.

Condensate Recovery vs. Advancement of Composition in Production

The change in composition of the production from any section depends on the recovery from that section. But by Equation 12 a change in composition defines the change in the position of the section. Therefore, the recovery from any section depends on the position of the section, that is

$$r = F(\Delta X) = F\left(\frac{\Delta C}{C\,\Delta r}\right) \quad (13)$$

The procedure for applying Equation 13 is illustrated by the curves in Fig. 29-2 and the following remarks:

1. Assume the position of a section as, for example, 1,000 ft. from an injection well.

2. Assume the composition of the production from this section, for example, 59 per cent dry gas; this fixes the recovery, 84.5 per cent at 1,000 ft. for 59.0 per cent displacing fluid in the production; this also fixes the value of $\Delta C/C\Delta r$, 12.5 in this example, see Fig. 29-1.

3. The value of $\Delta C/C\Delta r$ at any other section X is equal to 12.5 (X/1,000) which fixes the recovery r at X; for example, at X = 800 ft.; the value of $\Delta C/C\Delta r$ is 10 and the corresponding recovery equals 85.8 per cent.

The curves in Fig. 29-2 are solutions of Equation 13 for several compositions at 1,000 ft. away from an injection well. One curve is shown for the time at which the dry-wet gas interface just passes a section 400 ft. from the point of injection These data are for viscosity-compressibility ratios equal to 0.6.

Condensate Recovery from Points Along a Displacement Line

The effect of the distance between an injection well and a producing well is illustrated by the cross-hatched areas in Fig. 29-3. Consider a producing well located 1,000 ft. and another one at 4,000 ft. from an injection well.

Curve A shows the recovery along the line joining the injection well and the 1,000-ft. producing well at the time dry gas appears. The corresponding curve for an injection well at 4,000 ft. is B. The cross-hatched area between curves B and A represents the increase in recovery from the first 1,000 ft. relative to a well at 4,000 ft. The increase amounts to about 10 per cent. This increase does not refer to area. It represents the increase in recovery from the points along a displacement line.

Curves C and D show the corresponding recoveries for 59 per cent dry gas in the production. The recovery of condensate along a line within the first 1,000 ft. relative to a well at 4,000 ft. is about 5.7 per cent higher.

The effect of the variation in recovery along a displacement line on the recovery from the area invaded by dry gas will now be considered.

Displacement Factor for Condensate

Other things equal, the acre-feet of pay invaded by dry gas at the time dry gas first appears in a producing well is proportional to the square of the distance between an injection well and a producing well. If we lay out a number of bands within an invaded region having a width ΔX feet, the area within each band is approximately proportional to the square of the average distance from an injection well. Hence, we have to plot recovery against the square of the distance from an injection well in order to obtain recoveries relative to area.

The curves in Fig. 29-4 show the effect of distance and per cent dry gas in production on recovery of condensate. The curves in this figure correspond to those in the preceding one. The recovery of condensate from the first 1,000 ft. about an injection well relative to producing wells at 1,000 and 4,000 ft. respectively is about 5.8 per cent higher at breakthrough and about 4.5 per cent higher at 59 per cent dry gas in production. The average value of the recoveries given by these curves is the displacement factor for uniform pay thickness.

It follows from the foregoing considerations that one of the several disadvantages of locating producing wells near injection wells in cycling projects is a lower recovery relative to a given per cent of dry gas in production. There is no profit in recycling dry gas. The problem in cycling operations is to achieve the maximum possible recovery of condensate before dry gas appears in producing wells. Distance between injection and producing wells is the answer from the viewpoint of recovery from invaded regions. So much for condensate. We will now consider displacement factors for oil by water displacement.

Composition of Production vs. Oil Recovery

In Article 20 of this series it was shown that oil recovery by water displacement can be expressed in terms of per cent cut in the production from any point. The C curve in Fig. 29-5 illustrates the relationship between oil recovery and per cent water in the production from a point. The curve is for viscosity of water equal to one-third of the vis-

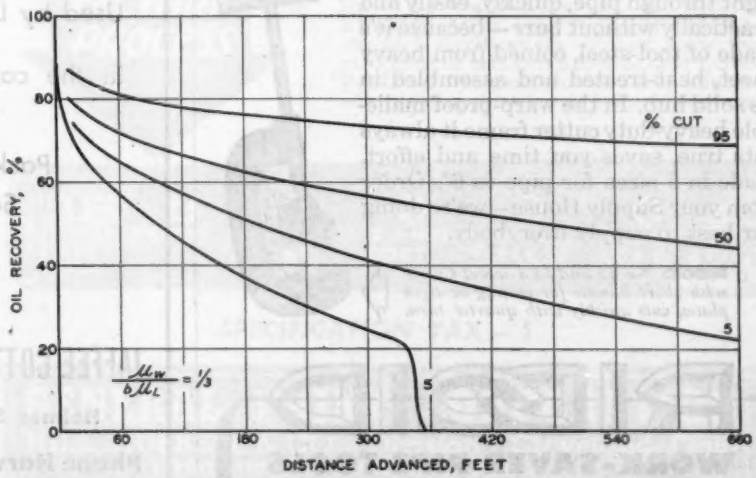


Fig. 21-5—Oil recovery vs. advancement of the per cent cut in production

PIPE CUTTING
with
Less Effort, More Speed

RIDGID
Thin Blade Cutter

● That unusual thin-blade wheel knifes right through pipe, quickly, easily and practically without burr—because it's made of tool-steel, coined from heavy sheet, heat-treated and assembled in its solid hub. In the warp-proof malleable heavy-duty cutter frame it always cuts true, saves you time and effort. Made in 5 sizes for pipe to 6". Order from your Supply House—we're doing our best to supply everybody.

RIDGID *No. 42 and 44 4-wheel Cutter with short handle for cutting in tight places, cuts quickly with quarter turn.*

RIDGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U.S.A.

SIX-INCH STROKE
POWER PUMPS
LINERS 2½" to 4"

QUALITY
ENDURANCE
DEPENDABILITY

Heavy duty designs—engineered for dependable Oil Field Service—gives the ultimate in efficient service. Our engineering staff is available for information or installation and requirements.
Write today for Catalog 200.

McGOWAN PUMPS

LEYMAN MANUFACTURING CORP.
The JOHN H. McGOWAN Co. DIVISION
50 CENTRAL AVE. CINCINNATI 2, OHIO

COTO-FIBRE
the
ACE MUD CONDITIONER

Used by Leading Drilling Companies

In the control of lost circulation in cavernous areas

Packed 600 lb. per bale
Samples on request

Manufactured by

JAFFEE COTTON PRODUCTS MFG. CO. INC.
Holmes Street Road & Jaffee Drive
Phone Harwood 5134 Dallas, Texas

cosity and volume factor product of the reservoir liquid in place.

The change in the composition ΔC of the production per unit increase in recovery Δr is illustrated by the $\Delta C/\Delta r$ curve. The values given by this curve at any recovery divided by the composition corresponding to the recovery are indicated by the $\Delta C/C\Delta r$ curve. These curves illustrate the basic data used for estimating oil recovery from regions invaded by water.

Oil Recovery vs. Advancement of Composition in Production

The procedure for estimating oil recovery from any point along a displacement line is similar to that itemized in connection with Equation 13. The curves in Fig. 24-6 are solutions of Equation 13 for the data in Fig. 29-5.

The bottom curve in Fig. 29-6 is for 5 per cent water in the production from a well located 330 ft. from an injection well. The next higher curve is for 5 per cent water in the production from a well located 660 ft. from an injection well. The top curve is for 95 per cent water in the production at 660 ft.

The difference between the two 5 per cent curves shows the additional recovery available from the first 330 ft. along a displacement line. The difference between the 5 per cent and the 95 per cent curves show the additional oil recovery available along a displacement line as the water in the production increases from 5 per cent up to 95 per cent. These data are for straight displacement without help from gravity.

Displacement Factor for Oil

Other things equal, the acre-feet of pay invaded by water at the time water fingers into a producing well is proportional to the square of the distance from the source of the water. Hence, the recoveries from the points along a displacement line may be plotted against the square of the distance from a source of water to obtain oil recovery from the points within a given area. The average value of the recoveries from the points within an invaded area is the displacement factor for that area. Invaded areas will be considered in the next article.

References

1. Buckley and Leverett, A.I.M.E., T.P. No. 1337.

BOOKS

A STUDY OF SECONDARY-RECOVERY POSSIBILITIES OF THE HOGSHOOTER FIELD, Washington County, Oklahoma. By I. W. Fox, C. H. Thigpen, R. L. Ginter, and G. P. Alden, Conservation Branch, Oil & Gas Leasing Division, U.S.G.S. 68 pp.

This is the first of a series of informal reports, dealing with fruitful results of experiments in the Hogshooter field. It has long been realized that the rate of finding new oil reserves is so slow that the productive capacity of the known reserves will be inadequate to meet the increasing consumption and that the large volumes of oil remaining in the majority of the so-called depleted and semidepleted producing fields constitute a potential reserve of millions of barrels of crude oil. Those reserves, increasingly important for war use, can be recovered only by the application of secondary-recovery methods, such as repressuring with air, gas, and water. Any successful secondary-recovery project must be preceded by a petroleum-engineering study in order that the oil producer will have some conception as to the quantity of oil he can expect to recover, the cost of such recovery, and the rate at which it can be recovered. The report dealing with the Hogshooter field gives the results of the study of the possibilities of applying secondary recovery to the Bartlesville sand. It reviews the conditions under which early production was effected and invites attention to some of the areas deemed most favorable for secondary-recovery projects.

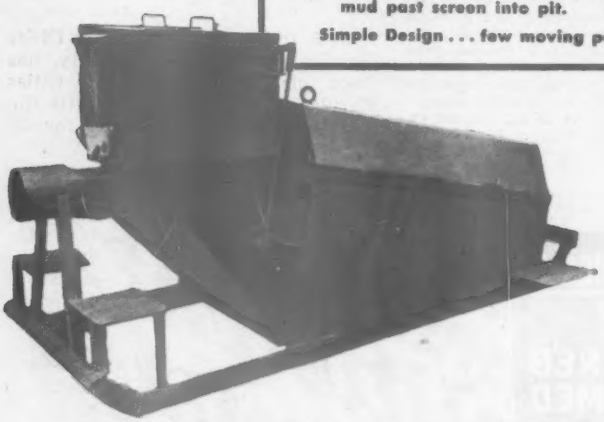
Copies of the report may be had, upon request, from the Oil and Gas Supervisor, Federal Building, Tulsa.

S. B. Irelan, president of the Cities Service Co. in Oklahoma City, has been elected a director of Cities Service Co. Irelan has been with the company and its affiliates for 36 years.

MECHANICALLY
CLEANED and PRIMED
MULTI-COATED
and WRAPPED
by FACTORY PROCESS
HILL-HUBBELL
Biturine Enamel is
+ STEEL PIPE PROTECTION
THE BOOK OF PIPE PROTECTION
Write for the detailed BOOK OF PIPE PROTECTION; it contains all standard specification charts.
Pipe Line Engineers know that specifying Steel Pipe Protection can be simplified with H. H. processing to combat nature's destructive elements that differ in each locality — they know the importance of proper protection — they know the qualifications of BITURINE ENAMEL—they know HILL-HUBBELL standard specifications — they know the principles of HILL-HUBBELL and COMPANY. We warrant each carefully inspected carload to the last rail point of delivery.
1 CLEANED PIPE
2 PRIMER
3 1st. HOT COAT
4 2nd. HOT COAT
5 SATURATED FELT
6 3rd. HOT COAT
80 LB. KRAFT PAPER
SPECIFICATION TAX — 1
GENERAL PAINT CORPORATION
HILL, HUBBELL & CO. • Division • Cleveland, Ohio
• EXPORT OFFICE SAN FRANCISCO, CALIFORNIA, U. S. A. •

Features

- Mud Driven . . . no motors, engines or gears.
- Perfected, easily accessible sample Catcher.
- Chemical Mixer available.
- Valve controlled by-pass to direct mud past screen into pit.
- Simple Design . . . few moving parts.



Get more efficient, more economical mud screening by using SIW MUD SCREEN. Write us for latest bulletin, or ask your supply store.

that mean added service from

S-I-W MUD SCREEN

The importance of mud in modern drilling techniques necessitates the use of a dependable, thorough-cleaning mud screen. The SIW MUD SCREEN is the answer to this need. Its many proven features assure outstanding performance. Its approximately 36 sq. ft. of standard mesh Rek-tang screen, rotating on the screen drum, thoroughly removes shale, abrasives, cuttings, etc., from the mud.

It has no motors . . . no engines . . . no gears. The screen is driven by the mud flow through a power wheel which is an integral part of the rotating screen.

SUNSHINE IRON WORKS

Manufacturers of Oil Field Specialties

P. O. Box 4106 **ODESSA, TEXAS** Phone 266

OWEN Type "B"
TOOL CHEST--WORK BENCH

This 5 foot bench has the same construction and convenience features as the 8 foot model. It has the central drawer locking system, roller mounted drawers, large rag bin, welded and braced vise stand, skid mounting, all-steel construction, welded throughout.

The working surface is 5' by 24" with a 12" panel at the back fitted with pegs where tools can be kept within easy reach while working.

OWEN TOOL CO.

1825 WASHINGTON AVE. — CAP. 0211

HOUSTON 10, TEXAS

You Need This Combination

WHERE ENGINES RUN HOT!

In oil field engines, the extreme heats generated by gas fuel place a heavy burden on valve stems, piston rings and cylinder walls. Critical top cylinder areas do not receive even the small benefit of the scant lubricating value in liquid fuels. That's why the use of Marvel Mystery Oil with the Marvel Inverse Oiler has become standard practice wherever gas fueled engines are in service. For, where ordinary lubricants lose their function and normal film strength breaks down, Marvel Mystery Oil sustains its remarkable efficiency.

The Marvel Inverse Oiler proportions the flow of Marvel Mystery Oil precisely to the needs of the engine. Its cost is low and installation simple. Ask us to show you what this combination can do in reducing your "down" time for engine overhauls. Emerol Manufacturing Co., Inc., 242 W. 69th St., New York 23, N. Y.

use the **MARVEL**

INVERSE OILER WITH MARVEL MYSTERY OIL

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Steam Requirements Of Turbines

We have a large amount of low-pressure steam. How can we use this in a turbine for more power? How much steam is required to produce a horsepower?—B.C.W.

Although steam has a lot of heat or energy in it, much of the heat consists of heat of vaporization and hence this large amount of heat cannot be recovered unless the steam is condensed. In all present types of engines and turbines the steam is not condensed and hence these equipments utilize only 5 to 20 per cent of the heat contained in the steam.

In a steam turbine, the steam expands adiabatically (theoretically) from the high pressure to the low or exhaust pressure, and the difference in the heat content before and after the expansion is the amount of heat or energy that can be utilized by the engine. In practice, the operation is efficient to the extent of only 30 to 60 per cent (see Table 1) for single stage turbines. The constant (2,546.5) in the following formula is the number of B.t.u. that is contained in 1 hp.

$$W = \frac{2{,}546.5 \times 100}{(H_1 - H_2)\,E}$$

in which:

W = lb. steam per hp. hour
H_1 = heat in high-pressure steam
H_2 = heat in exhaust steam
E = efficiency, per cent

The total heat indicated by symbols H_1 and H_2 may be read from steam tables or better from a Mollier (or entropy) diagram. After determining H_1, the value of H_2 should be read for the same entropy as H_1.

The above formula may be written in a form that gives the horsepower

$$H.P. = \frac{S\,(H_1 - H_2)\,E}{254{,}650}$$

in which S is the pounds of exhaust steam available each hour.

Efficiency of single stage turbines ranges from about 30 per cent for the smallest turbines operating at an unfavorable steam pressure whereas the highest efficiencies of 60 per cent are for large installations operating under the conditions for which they were designed. Table 1 shows efficiencies for single-stage direct-connected noncondensing turbines, and for single-stage geared (high blade speed) turbines.

W. L. NELSON

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Table 2 was computed for steam-pressure conditions that are common in refineries so that an idea of the amounts of power in exhaust steam can be judged. An efficiency of 45 per cent was used for all situations.

TABLE 1—EFFICIENCY (RATIOS) OF SINGLE STAGE NONCONDENSING TURBINES

B. Hp.	Regular turbines	High-blade-speed geared turbines
25	34-44%	42-51%
50	37-46	44-53
100	40-48	46-55
200	44-51	49-57
400	48-54	53-59

TABLE 2—HORSEPOWER AVAILABLE IN EACH 1,000 LB. OF EXHAUST STEAM

Steam pressure—Inlet	Steam pressure—Outlet	Water rate lb. per hour	Hp. per 1,000 lb. steam
35 Ga.	5 Ga.	87	11.5
25	5	116	8.6
15	5	202	4.9
35	atmos.	68	14.6
25	atmos.	84	11.8
15	atmos.	123	8.1
35	20 atmos. vac.	38	26.6
25	20 atmos. vac.	42	23.8
15	20 atmos. vac.	50	20.2
5	20 atmos. vac.	66	15.2
35	28.5 atmos. vac.	24	41.5
25	28.5 atmos. vac.	26	38.7
15	28.5 atmos. vac.	29	35.0
5	28.5 atmos. vac.	33	30.0

Properties of Oils—Their Significance

I remember some questions on the performance of gasolines and kerosenes on the Questions on Technology page but I am unable to locate them. Can you send me a list?

No type of information is more practical than that which pertains to the performance of products when used in commercial equipment. In fact, the effect of the quality of the fuel, oil, etc., on the performance of the machines in which they are used should be the single most important consideration of refiners, marketers, and the public. The importance of laboratory test procedures, plant processing improvements, etc., lies only in the fact that they are tools by which operations can be conducted.

The reason for the lack of adequate performance data is not primarily due to a lack of interest or of effort on the part of the refiner and the user, but rather to the difficulties encountered in accurately judging the performance of the oil or of the machine. Machines differ greatly in their design, state of repair, and what is required of the oil product; as well as a great variety of climatic and other conditions under which the machine must function.

Interest in the performance characteristics of products as related to their physical or laboratory-test properties is wholesome and valuable. Following is a list of questions which have appeared on this page which pertain directly to the significance of test properties.

Diesel fuels.—Detonation Characteristics of Diesel Fuels, October 2, 1941, page 42; Performance Characteristics of Diesel Fuel Oil, September 17, 1942, page 47.

Gasolines.—Lubricated Gasoline, June 19, 1941, page 61; Importance of Distillation Tests, June 16, 1938, page 62; A Perfect Gasoline, December 9, 1943, page 62; Tailor-Made Gasolines, January 6, 1944, page 63; Significance of Octane Number, February 3, 1945, page 66.

Lube oils.—Viscosity Index Versus Detergency of Diesel Oils, February 20, 1941, page 63; Significance of Neutralization Number, November 21, 1940, page 53; Carbon Residue Tests, January 11, 1940, page 48; Significance of Viscosity, November 23, 1939, page 46; Flash Tests Useful, September 1, 1938, page 42; Consumption of Engine Oil, September 17, 1944, page 73.

Miscellaneous.—Coal Spray Oil, August 21, 1941, page 56; Specifications of Stove Gasoline, April 25, 1940, page 189; Significance, Color, June 2, 1938, page 74; Classification of Solvents, April 15, 1943, page 134; Lighter Fluids, December 22, 1943, page 64; Smoke Point of Kerosene, September 30, 1944, page 101; Evaporation Losses at High Altitudes, December 9, 1944, page 83; Practical Significance of Vapor Pressure, January 6, 1945, page 76; Off-Specification Products, March 3, 1945, page 83.

UNIVERSITY OF MICHIGAN LIBRARIES

HORTONSPHERES perform a

CHICAGO BRIDGE

Chicago • Houston • New York • San Francisco • Birmingham

PLANTS IN: BIRMINGHAM, CHICAGO AND GREENVILLE, PA.

Double Duty for Aviation Gasoline Plants

ALL-OUT production of 100-octane gasoline has called for *all-out* protection of the components of this product. At the huge aviation gasoline plant where these pictures were taken, a portion of the capacity is devoted to the hydrogenation of selective polymer shipped from other plants and part of the hydro capacity is being used for producing high-octane aviation base stock. Hortonspheres are performing a double duty at this location as at many other aviation gasoline plants. These pressure spheres protect the volatile components of 100-octane gasoline from evaporation loss during their handling and storing. They also go a step further and guard the inherent quality of the products.

Hortonspheres operate on the principle that venting and accompanying vapor loss will not take place as long as the pressure in the vapor space does not exceed the setting of the relief valve. Use Hortonspheres for efficient storage of butane, isobutane, alkylate and even the finished fuel itself.

Write our nearest office for information or quotations on storage tanks of all types.

The Hortonsphere shown on the opposite page and those at the left are located at a leading aviation gasoline plant. They hold 2,500 bbls each and are designed to operate at 75 lbs. per sq. in. pressure. The Hortonsphere shown below, at the same location, holds 10,000 bbls. and operates at 75 lbs. per sq. in. pressure.

YOU CAN USE THE HORTONSPHERE . . . . . for the storage of many volatile liquids and gases. In addition to butane, isobutane and alkylate Hortonspheres are being used to store butadiene and other volatile petroleum products at synthetic rubber plants.

Hortonspheres are built for pressures as high as 100 lbs. per sq. in. up to 45 ft. diam.; 150 lbs. up to 30 ft. diam.; 200 lbs. up to 22½ ft. diam.; 250 lbs. up to 18 ft. diam.; and 300 lbs. up to 15 ft. diam. Hortonspheres are also built in sizes up to 65 ft. diam. for pressures from 20 to 100 lbs. per sq. in. for gases.

& IRON COMPANY

Cleveland • Tulsa • Los Angeles • Philadelphia • Washington

IN CANADA: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONTARIO

UNIVERSITY OF MICHIGAN LIBRARIES

MODERN DRILLING

A JOURNAL SERIES ON NEWEST DEVELOPMENTS IN ROTARY RIGS

Cardwell Model O Twin-Engine Draw Works

Salient Features

THE Model O is a heavy-duty draw works with 450-hp. input, and is recommended for drilling to 8,000 ft. with 4½-in. drill pipe or workover jobs to 15,000 ft. Manually controlled twin disk friction clutches drive the pump, draw works, and rotary table. Either or both engines may be used to drive the draw works, rotary table, or pump. Engines are fully synchronized and quickly adjustable from driller's position, with all other controls within easy reach.

Transmission and Drum Drives

Cardwell chain transmission has three speeds forward and one reverse. Pumped oil lubrication is provided to all chains and bearings with oil-pressure gage in front of the driller. Dual drum drives provide six speeds forward and two reverse to the lower drum, with all hoisting speeds instantly available. When rotating, no drives are running except to the rotary table, although catheads or drum may be engaged without stopping rotary table or slush pump.

Rotary table operates from transmission with three speeds forward and one reverse, through a twin disk friction clutch with automatic brake to quickly stop rotation of table. Rotary-table speeds range from 70 to 220 r.p.m. Rathole drive sprocket is built into the draw works. Hydromatic brake is available for installation on lower drum shaft. Single adjustment, fully equalized braking system is available with either circulating water or spray cooling system. Braking system without hydromatic brake will hold 6,500 ft. of 4½-in. drill pipe with six lines up.

Easily Transported

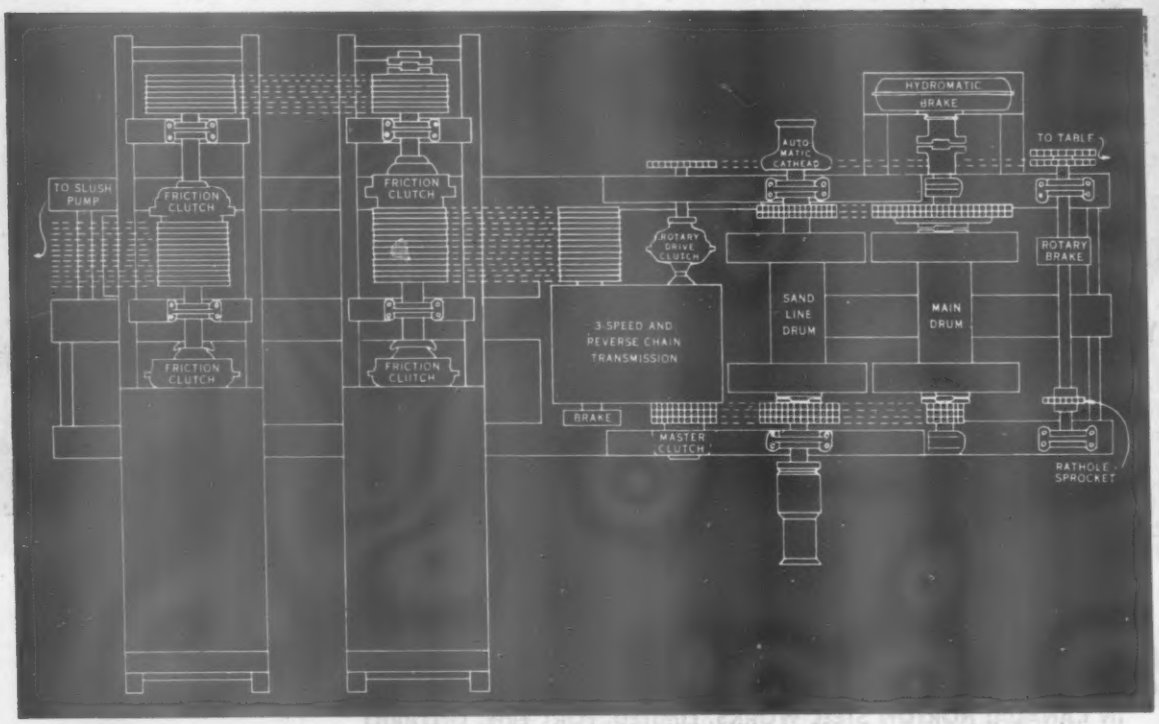
Draw works may be moved over highway without special permit, by removing engines and catheads. It is not necessary to remove bearings to take off the V-belt engine drives. Frame with three structural members running full length gives maximum strength and rigidity.

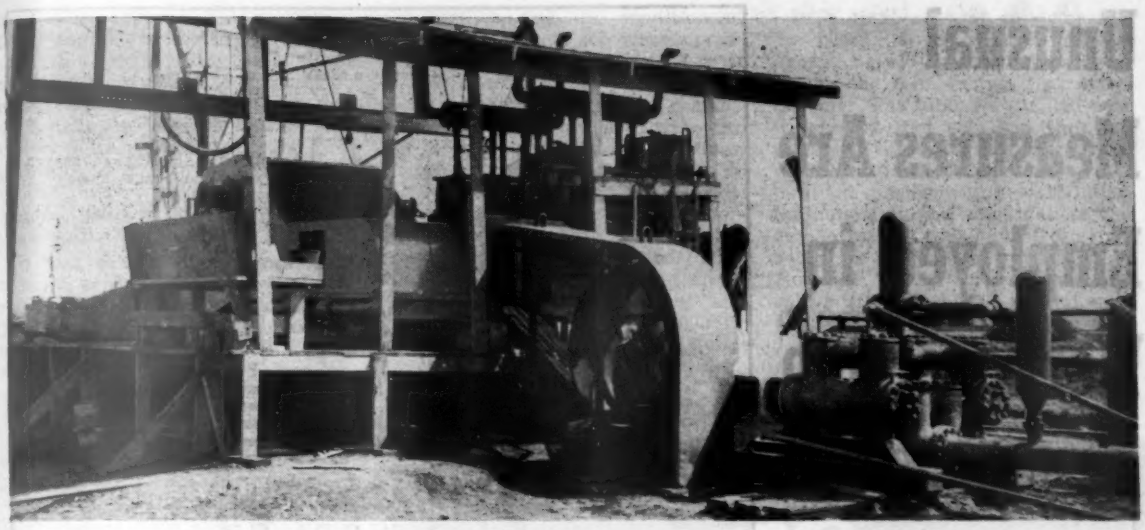
All wearing parts including brake flanges are heat treated. All sprockets are of cut steel and specially hardened. Optional sand-line drum assembly mounts on countershaft, making a double-drum draw works. All gasoline engines are standard with fireproofing and water-circulated exhaust spark arrester.

Chain Transmission

Transmission is a heavy-duty chain type with three speeds forward and one reverse. Self-aligning roller bearing and special heat-treated alloy-steel shafts are used throughout. Gear-tooth type engagement clutches sliding on splined shafts provide maximum service and require minimum effort for shifting. Pump lubrication is provided to all chains and bearings.

Power transmission from twin engines to draw works, rotary table, and pump





View from pump through two-engine setup to draw works

Mechanical Specifications

Drive data.—The engines drive through V-belt drives to the steel-cased chain transmission with three speeds forward and one reverse. From the right end of the output shaft there is a drive, controlled by a friction clutch, which spans both the main drum shaft and the countershaft. When the right drum jaw clutch is engaged, this drive rotates the drum and provides three high drum speeds.

On the opposite side of the draw works is a drive from the countershaft to the drum. When the left clutch is engaged, this drive rotates the drum and provides three lower drum speeds.

When going into the hole, the transmission is placed in gear and the low-speed drum clutch is used for lifting off the slips. The other drum clutch then provides a higher speed for elevating the empty blocks without shifting gears in the transmission.

Brakes.—Dual heavy-duty brakes are self-energizing, full-wrap type. Brakes have positive equalization, are fully adjusted by a single turnbuckle. Demountable brake flanges are fabricated of alloy-steel welded. Brakes are controlled by hand lever, with friction latch, easily adjusted. Main drum brakes are available with either circulating water cooler system or spray cooling. Sand line drum brakes are equipped with spray cooling.

Hydromatic brake.—Drum shaft is provided with an extension for mounting a hydromatic brake.

Rotary drive.—The rotary drive is controlled by a Twin Disc friction clutch. This clutch is mounted inside the frame and is equipped with split plates for easy replacement. A brake is also provided to stop rotation of the table. The sprocket on the drive shaft is standard for 1¾-in. pitch, single-strand Diamond roller chain. The rotary drive shaft, located in front of the main drum, is equipped with a rathole sprocket.

Clutches.—Twin Disc multiple-plate friction clutches are used for the rotary drive, drum drive, mud pump drive and master clutch. Heat-treated jaw clutches, used in the sand line drum and both ends of the main drum, are eight-jaw dental type of cast alloy steel. Jaws are jig machined with bevel undercut. Design eliminates the possibility of clutch disengaging while under load and insures equal contact on all jaws. A jaw clutch is also used on the engine compounding drive.

Controls.—The controls for the power takeoff clutches, mud-pump clutch, and compounding clutch are grouped in a convenient location on the engine frames. All other controls are located at the driller's position. All controls are manually operated with control shafts mounted on needle roller bearings for maximum ease of operation.

Sand-line drum.—Sand line drum is optional equipment and is mounted on countershaft. Drum is of fabricated steel construction, mounted on SKF self-aligning roller bearings.

Lubrication.—Chain drives in the transmission are pump lubricated. Rotary-table drive and other draw works drives are adequately oiled by drip system from a supply tank. Drum and shaft bearings are pressure lubricated. Pressure fittings are conveniently located.

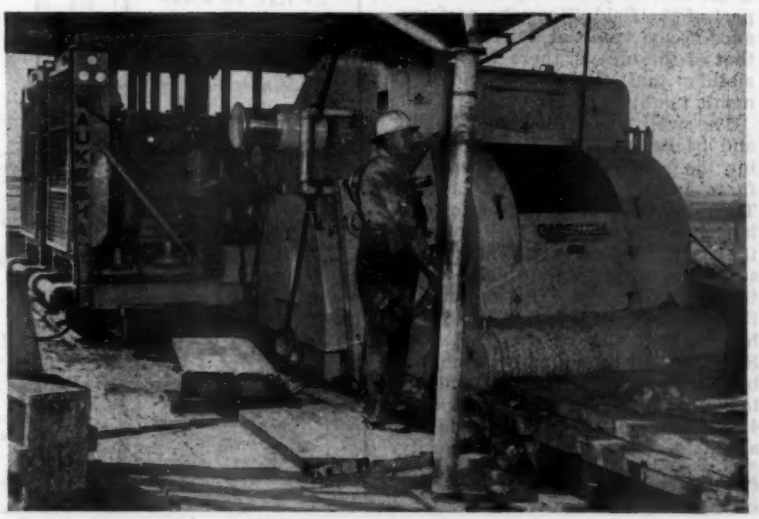
Slush-pump drive.—Slush-pump power takeoff on rear engine shaft is standard and is provided with 17-in. pitch diameter sheave grooved for 12-D-section belts. This pitch diameter sheave was selected to fit the average slush pump application. Other size sheaves may be furnished on special order.

Catheads.—An extended-type cathead is used on the driller's side and an automatic cathead on the side opposite the driller. Spinning-line catheads optional as extra equipment.

Instruments.—A speed indicator is furnished to show engine speeds. Vacuum gages for gas or gasoline engines, or pyrometers for diesel engines are provided to indicate the relative power being developed by each engine.

MODERN DRILLING

View showing compact, fully enclosed arrangement of draw works



Unusual Measures Are Employed in Workover Job

by Charles J. Deegan

THE problem of determining what can be done to reduce excessive gas-oil ratios in producing wells sometimes requires unusual measures. A. G. Oliphant, independent operator, had such a problem with 1 Joel Jones, SE SE 16-17s-20w, in the Magnolia field. Columbia County, Arkansas.

Because of excessive gas-oil ratio, the allowable on this well was being penalized from the normal 140 bbl. per day to 80 bbl. Remedial work was decided upon and a study of the well records was started. In this field, production is from the Reynolds oolitic zone of the Smackover lime. There are two distinct producing zones in the Reynolds, known locally as the "first porosity", and the "main porosity." At this location they are separated by 4 ft. of tight formation.

The well records indicated that the 6-in. pipe was cemented at 7,514 ft., which should have put the casing seat 4 ft. below the bottom of the first porosity, and immediately on top of the main porosity, which is the best-oil producing zone in this part of the field. Since the performance of the well did not conform to that of the offsets, there was a possibility that the casing measurements might be in error.

The well was killed, and tubing and packer pulled. After conditioning the hole, operators deepened 10 ft. to a new total depth of 7,560 ft. Then the hole below the 6-in. casing shoe was reamed to 9 in., and the electric log was run. The electric survey confirmed the suspicion about the casing record. The bottom of the pipe was at 7,504 ft., or 10 ft. higher than the records indicated. Since the tight streak between the bottom of the first porosity and the top of the main porosity was only 4 ft. thick, this error had permitted a 6-ft. section of the first porosity

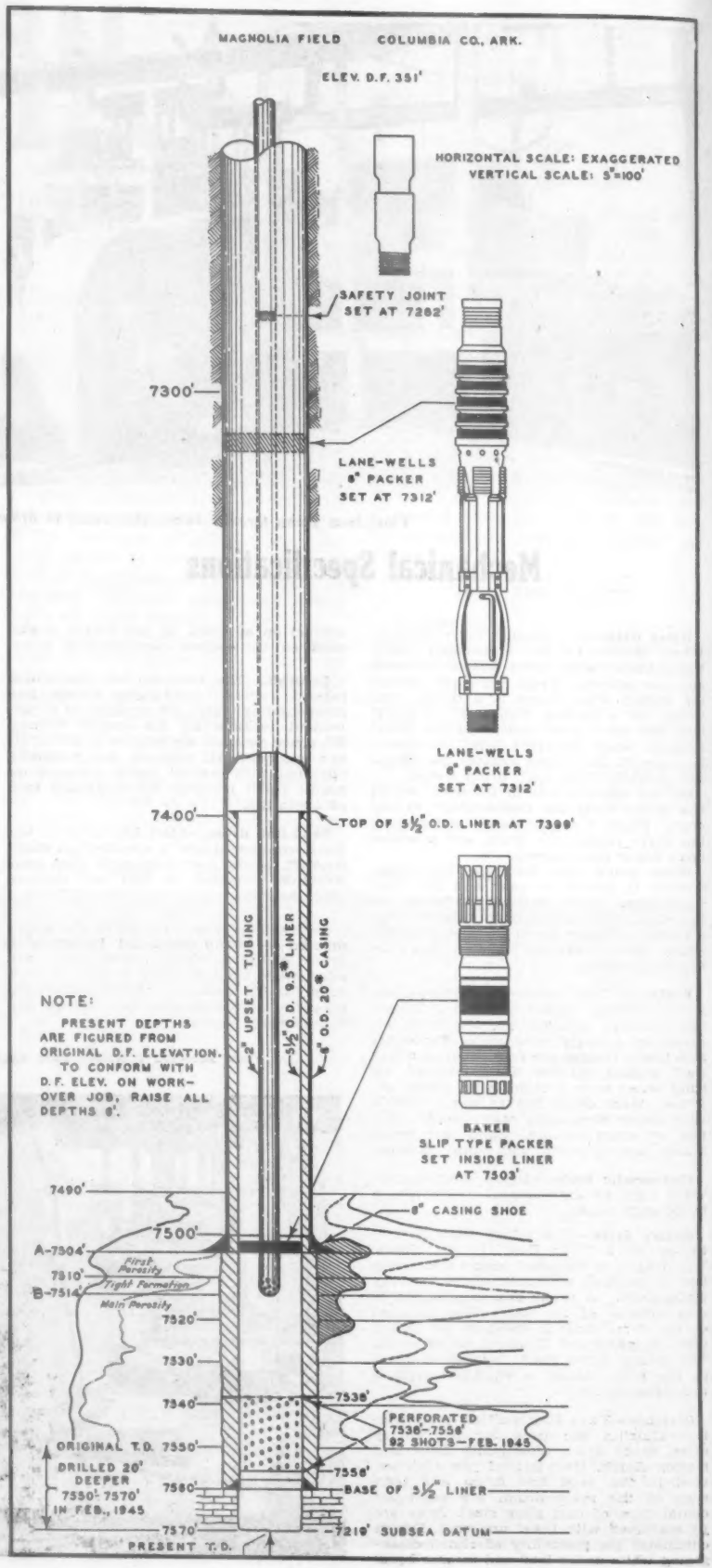


Fig. 1—Packer arrangement to remedy faulty cement job.

zone to be exposed. This seemed a likely source for the excess gas.

At this stage, with the well at total depth of 7,560 ft., and corrected casing seat at 7,504 ft., there was 56 ft. of open hole. It was decided to run a liner to shut off the first porosity, so 161 ft. of 5½-in. o.d., 9.5-lb. liner was landed and cemented, using a Baker duplex float shoe on the bottom of the liner.

It was calculated that not more than 25 sacks of cement would be required to fill the annular space. Therefore 35 sacks were used, and after disengaging from the bottom of the liner, circulation was reversed, until all excess cement was washed from above the liner. The cement was allowed to set for 54 hours, after which the hole was completely conditioned. Then the liner was perforated with 92 shots at 7,538-56 ft. Tubing and packer were run and the well was swabbed on to production.

Normal Gas-Oil Ratio

The well flowed at a normal gas-oil ratio, and for 3 hours it appeared as though another routine workover job had been handled satisfactorily without unusual problems. Then the gas-oil ratio increased rapidly to a point far above normal. This indicated that either the perforations in the liner were too high or that the cement job on the liner had failed to exclude the gas.

E. Floyd Miller, geologist and production engineer for the operator was assigned to the problem. After checking the field records and cross-sections, he decided that at this location the first porosity zone carried only gas, and that the main porosity was fully saturated with oil.

If this were true, then the gas must be coming from the first porosity zone and the cement job was faulty. The 3-hour lapse from the time the production test was started until the gas-oil ratio began to increase could be explained. Field regulations required that a casing packer be set not more than 250 ft. above the bottom of the hole to prevent casing corrosion by sulfur gas, and this well was so equipped. Gas coming up from the first porosity through the faulty cement job between the liner and the casing would pass out into the casing at the top of the liner. It would fill the casing up to the packer, then be forced down inside the annular space between the tubing and the liner, until it reached the perforations in the tubing, where it would mingle with the oil from the main porosity zone. It would also exert back pressure on the oil in the main porosity zone.

A recementing job was indicated. Due to a combination of local field peculiarities, and the condition of the hole, a squeeze job was impractical. A test was made to see if the formation would break down, or be susceptible to taking cement. A Yowell tool was set inside the 5½-in. liner, above the perforations. Pressure was built up to 2,500 lb. but failed to get circulation, indicating that at least part of the formation, and perhaps part of the liner, was tightly cemented. Then the Yowell tool was set just above the liner in the 6-in. casing, and pressure was built up to 6,000 lb. and held for 10 minutes without breaking down the formation.

In a final attempt to determine the possibility of recementing the liner, a Baker two-way retainer was run in the 6-in. casing, just above the liner. The tubing was filled with water, the tool set, and the well swabbed until it was practically ready to flow. Then pressure was built up by connecting to Halliburton pumps. In this way, if there was any formation breakdown, the liner could be recemented immediately. However, no pressure break was shown after reaching a maximum of 5,800 lb.

Having found it impossible to recement the liner, the next test was

MOTOR RECONDITIONING by experts!

YOUR Automotive Jobber!

Gasoline and Diesel motors, pumps, compressors and a multitude of other mechanical units can be promptly serviced or reconditioned by your Automotive Jobber. In addition to a complete stock of over a 100,000 service parts, tools and equipment, he maintains a completely equipped machine shop staffed by skilled personnel accustomed to precision work. He can be an invaluable source of thoroughly experienced, prompt, intelligent service.

You can depend upon your Automotive JOBBER!

NSPA

PARTS • TOOLS • EQUIPMENT
ACCESSORIES • SUPPLIES

THE COMPLETE ASSOCIATION

Devoted to maintaining and improving the Quality Standards of Service Parts, Equipment and Accessories manufacture, distribution and installation in America's thirty million automotive vehicles, and millions of internal combustion engines, and mechanical equipment.

NATIONAL STANDARD PARTS ASSOCIATION
35th Floor, 8 South Michigan Avenue, Chicago 3, Illinois

UNIVERSITY OF MICHIGAN LIBRARIES

Record Drilling Demands the Best...

ROPE REMINDERS

When you look at wire rope performance records it sometimes pays to remember that wire rope is part of a *team*.

The point is that the world's best wire rope can't give you lasting service when the machinery over which it is operating is off the beam.

Wire rope can't give full service with improper sheaves—drums—reeving . . . poor general operating conditions.

The answer is regular inspection not only of the rope but of everything that pertains to its efficient operation.

And if abnormal wear seems to be evidenced, call in a Roebling engineer. He makes tests and recommendations that will save you future rope worries and excessive costs.

TODAY'S RECORD OIL FIELD OPERATIONS tax men and equipment heavily. Nowhere is wire rope subject to tougher service conditions. That's why only the best will do on your rotary drilling, winch, and casing and tubing lines. That's why you need Roebling "Blue Center" Wire Rope . . . for dependability on the tough jobs . . . at lower operating cost.

After all, the basis of good wire rope is the steel in the wires. Roebling "Blue Center" Steel—the finest wire rope steel produced—is custom-made in our *small* open-hearth furnaces. Add 104 years of experience in rope-making . . . unsurpassed facilities for research—testing—manufacturing . . . and *you* get utmost wire rope value.

Roebling engineers are at your service . . . to help you select the right rope . . . get maximum service from it. Check our nearest branch office.

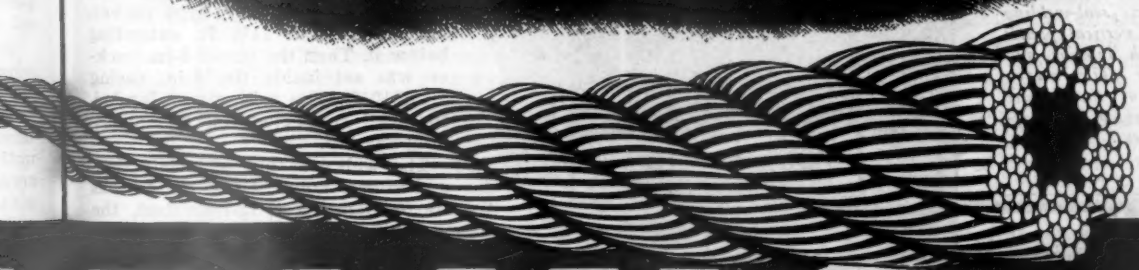
JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

Wire Rope *Distributed by:*
THE NATIONAL SUPPLY CO.
REPUBLIC SUPPLY CO.

ROE

PACEMAKER IN

IT'S A JOB FOR
ROEBLING
WIRE ROPE!



BLING

JAR ROEBLING

WIRE PRODUCTS

to prove where the cement failure was by finding what route the gas was taking into the tubing, whether upward between the liner and the casing, or downward outside the liner until it reached the liner perforations.

Before making this test, it was decided to deepen the hole 10 ft., to a new total depth of 7,570 ft. This was completed and the hole put in condition for a drill-stem test inside the 5½-in. liner. A Halliburton hook-wall packer was set at 7,478 ft., which was 85 ft. below the top of the liner, and 60 ft. above the perforations. This would pack off from the perforations any gas that was traveling upward between the liner and the casing.

Using a 1,500-ft. water cushion, and ¼-in. positive chokes on top and bottom, the drill-stem test was started. The well began flowing water in 25 minutes; mud, gas and oil in 40 minutes, and oil in 47 minutes. At this point the tubing pressure was 800 lb.

After flowing into the pits for 1 hour, the well was turned into the tanks. On a 6-hour test, with a ¼-in. positive choke on top, and a flowing pressure of 800 lb. on the tubing, the well flowed an average of 21⅝ bbl. per hour, with a gas-oil ratio of 744 cu. ft. Then the top choke was reduced to ⅛ in., and the flowing pressure on the tubing increased to 850 lb., while the oil flow dropped to 11⅛ bbl. per hour with a gas-oil ratio of 824 cu. ft.

This test proved that the gas was shut off below the first porosity zone, and that it must be coming up between the liner and the casing. The failure in the cement job was around the gas horizon and above that point between the casing and the liner.

Now the problem was to pack off the gas coming up between the liner and the casing and at the same time conform to the field regulations requiring a packer not more than 250 ft. above the bottom of the hole. By setting one packer up in the casing to conform to the field regulations, and another well below the top of the liner, but above the perforations opposite the main porosity zone, the gas coming from the first porosity would be trapped between the two packers.

Slip-Type Packer on Bottom

It was decided to use a Baker slip-type packer on the bottom. This was set in the liner at 7,503 ft., which put it 103 ft. below the top of the liner, and 35 ft. above the top of the liner perforations. Then the tubing was pulled, and a Lane-Wells Quintana seal 6-in. packer was placed on the tubing, with 2½-in. upset tubing above the packer, and 2-in. upset below it. On the bottom of the tubing string a 19-ft. polished, 2-in. stringer joint was set. The bottom of the stringer joint was perforated for 3 ft. with 30 holes.

The tubing was then rerun and the polished stringer joint was forced through the slip-type packer, until there was 11½ ft. extending below it. Then the upper 6-in. packer was set inside the 6-in. casing at 7,312 ft. The tubing was landed, the well connected up, and swabbing started.

The well was put on production, and after 8 hours, a test period was started. During a 12-hour test, the well averaged 8 bbl. per hour through a 7/64-in. adjustable choke with a flowing pressure on the tubing of 1,000 lb., and a gas-oil ratio of 814 cu. ft. This gas-oil ratio was considered satisfactory as the Bureau of Mines had estimated the initial gas-oil ratio for the field at 825 cu. ft.

After completion of remedial work, the allowable was restored to 140 bbl. per day and the well is now flowing its production without trouble.

Robert L. Lee has moved from Oakland, Calif., to Oklahoma City to become field engineer for Schlumberger Oil Well Surveying Corp.

LEADERSHIP—

that saves you money

It has always been the policy of Stacey Brothers to improve gas holders. It is natural, therefore, that our holders have won recognition as being unequalled for design, efficiency, and quality of workmanship.
Our latest development is the All-Welded Panel Type Wet Seal Holder. This modern holder offers you the triple benefits of REDUCED MAINTENANCE COSTS . . . GREATER STRENGTH . . . LONGER LIFE. The costly and troublesome interior corrosion problems usually associated with wet seal holders have been reduced to a negligible factor in this new Stacey Brothers Gas Holder. Let us figure now on your post-war needs.

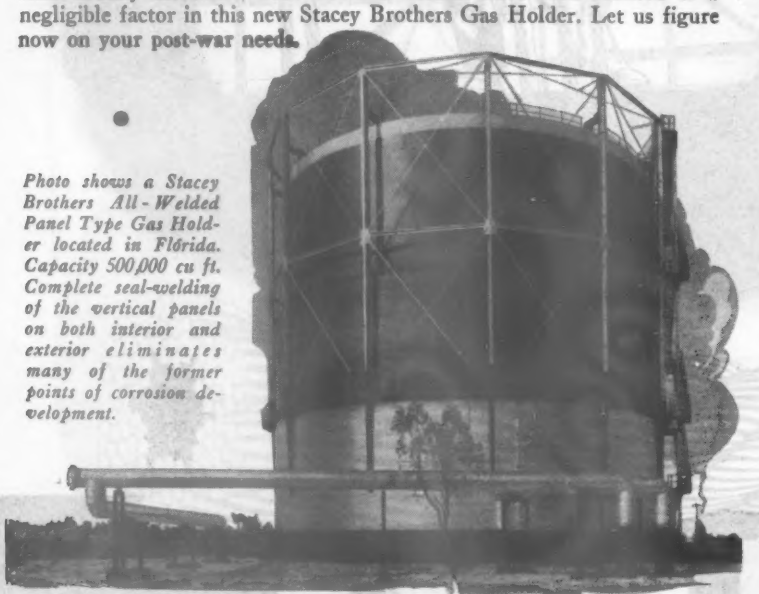


Photo shows a Stacey Brothers All-Welded Panel Type Gas Holder located in Florida. Capacity 500,000 cu ft. Complete seal-welding of the vertical panels on both interior and exterior eliminates many of the former points of corrosion development.

The STACEY BROS. GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 Vine St., Cincinnati 16, Ohio

ALL-WELDED PANEL TYPE
GAS HOLDERS

Stacey Brothers
ENGINEERS • FABRICATORS
ERECTORS • RECOGNIZED
EXPERIENCE & FACILITIES

Corrections in Measurements Of Crude-Oil Volumes

Errors in oil measurements.—The chief errors in oil measurements after tank volumes have been carefully measured, checked, and steel measuring tapes calibrated with a standard tape can be caused by: (1) Failure to adjust for changes in temperature; (2) presence of minute gas bubbles in suspension in the oil and (3) minute suspensions of water in the oil.

Corrections for temperature.—The average annual temperature of the surface atmosphere in the middle portion of the country is about 60° F. (In Central Texas it is about 70°). By agreement the committee on standards have set 60° F. as a standard of reference for calibrating measuring devices and recording accurate measurements. Since oil increases in volume with temperature, it is necessary, in order to compare measurements, to reduce all measured volumes made above or below 60° F. to the 60° standard. The amount of correction depends upon the number of degrees of temperature above or below 60 and the gravity of the oil. Therefore, those two factors need to be obtained accurately at the exact time of gaging the oil in the tank. The gravity of oil is obtained by taking a sample of oil by means of a sampling device, known as a "thief," from the top, middle, and bottom portions of the tank being gaged, and measuring the gravities with an accurate hydrometer used in a standard hydrometer flask, according to directions issued in A.S.T.M., designation D 287-30T. The temperature of the oil is measured with an accurate thermometer immersed in a metal cup with handle (Fig. 1). The cup which is best made in the form of a thief, is suspended on a string and lowered with the thermometer the desired distance into the oil left at least 10 minutes, then withdrawn to the surface, and the temperature read as soon as possible. While reading, the cup is held within the gage hatch out of the way of cold winds. The temperature is checked with at least three readings. If the temperature of the oil is found to vary from top to bottom in the oil tank, a condition referred to by gagers as oil stratification, then a larger number of readings are necessary and the average temperature is calculated. The American Petroleum Institute recommends that where the depth of oil is 15 ft. or more that at least three temperature readings be taken, the first 3 ft. from the top, the second in the middle, and the third 3 ft. from the bottom.

Fig. 1 — Thermometer with cup and handle used in measuring temperature of oil in tanks

Method of calculating volume corrections.—The method commonly used in making volume corrections is that described by U. S. Bureau Oil Standards Circular No. 154 which recommends expansion coefficients for each gravity of oil. A common shortcut in this method is to divide crude oil into six groups, according to their gravity, and apply a coefficient for each group instead of using separate coefficients for each gravity. For the six groups, their range in gravities and coefficients of expansion at 60° F. are shown in Table 1.

TABLE 1
COEFFICIENTS OF EXPANSION FOR VARIOUS GROUPS OF CRUDE OIL

Group No.	Range of gr. of each group, deg. A.P.I. at 60° F.	Coef. of exp. at 60° F.
1	up to 34.9	0.0004
2	35 to 50.9	0.0005
3	51 to 63.9	0.0006
4	64 to 78.9	0.0007
5	79 to 88.9	0.0008
6	higher than 89	0.00085

The volume can then be easily corrected to 60° F. by measuring the temperature and gravity and obtaining the expansion coefficient from the above table. The method is illustrated by the following example:

What is the volume at 60° F. of 8,010 gal. of oil found to have, when gaging, a gravity of 25.0° A.P.I., a temperature of 92° F.?

The coefficient of expansion factor from the above table for oils having a gravity up to 34.9° gravity A.P.I. is .0004

92° F. — 60° F. = 32° F.
8,010 × (.0004 × 32) = 103
8,010 — 103 = 7,907 gal. at 60° F.

Correcting errors due to gas.—If an appreciable amount of gas is found in the oil, the tank is allowed to stand 24 to 48 hours before gaging so that the gas may be dissipated. In many places, however, gas in the oil tanks can be reduced by adjusting chokes, gas separators, and rates of flow into the gun barrel.

Correcting errors due to water.—The volume of water in the oil is measured by means of a centrifuge, or, by the A.S.T.M. D 95 — 30' method, the per cent of water calculated, and the amount of water per barrel deducted from the volume of oil.

References

1. MacLean, M. D., Essentials of Fluid Volume Measurements and Discussion of Factors Involved: Inter. Pet. Tech., vol. 8, pp. 99-104, Oct. 1932.
2. Mitchell, G. S., Tables Compiled for Correcting Oil Volumes for Temperature: Nat. Pet. News, pp. 61-68, July 2, 1930.
3. Parker, J. S., Measurement and Sampling of Mineral Oil: Jour. Inst. Pet. Tech., vol. 16, pp. 565-572, June 1930.
4. American Society for Testing Materials, Report of Committee D-2 on Petroleum Products and Lubricants, pp. 182-189, 1930.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

RIDGID

No. 1R Poster Die Stock

● Compare this RIDGID with any poster die stock on the market and see how it gives you better threading service for your money. Direct action, handle to head to chasers, prevents cock-wobble: result—less work, smoother threads. Workholder is quick and fool-proof, no bushings to bother with. Alloy or high-speed steel chaser dies for 1", 1¼", 1½"and 2". A rugged steel-and-malleable tool you'll like, including the price! Ask for the RIDGID 1R at your Supply House—demand exceeds supply, but keep asking.

RIDGID

WORK-SAVER PIPE TOOLS

THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U. S. A.

BETTER ALLOYS = Better Valve Checks

THE REASON FOR NO-CO-RO SUPREMACY

● For nearly half a century Norris Brothers, Inc., have specialized in the development of better steels as the *first* requirement of more efficient, longer-lasting valve checks. The resultant alloy—NO-CO-RO—is a truly remarkable metallurgical achievement. It resists the action of salt and acid. It will not pit, chip, or corrode—and it is available *only* in NO-CO-RO Balls and Seats and NO-CO-RO Drops and Seats.

Norris Brothers, INC.

ROBINSON · ILLINOIS

why engineers insist on

DAVIS DIA-BALL TRANSMISSIONS

Davis No. 168D Float and Lever Tank Unit Flange mounted with Davis No. 668 Packless Control Valve

The patented Davis Dia-Ball Transmission is a leak-proof, packless diaphragm ball transmission arm for Davis Liquid Level Controllers, Float Boxes and Float and Lever Units. Engineers recognize its superiority over the conventional packing box. Here's why: 1) Friction almost eliminated with ball and socket joint, insuring accurate power transmission; 2) Straightlined Power eliminates lost motion, minimizes friction, providing maximum accuracy and sensitivity; 3) Simple construction minimizes maintenance—no leaky shaft or stem packing—no packing box nuts to tighten; 4) Dangers inevitable with volatile or inflammable liquids are eliminated because of Dia-Ball leakproof feature. Write for details!

DAVIS REGULATOR COMPANY

2543 S. Washtenaw Avenue, Chicago 8, Illinois

DAVIS REGULATOR COMPANY

Distributor: Westcott & Greis, Inc., Tulsa, Dallas and Houston

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Heat of Vaporization

THE two figures on these pages show the latent heat of vaporization (or condensation) for paraffin base, intermediate base, naphthene base, and cracked stocks. Latent heat is expressed as British thermal units per pound. The heavy line at the top of each figure shows the latent heat at the regular boiling points of the oils or hydrocarbons; these are the values normally found in handbooks, tabulations, etc. The curving lines show the latent heat for other pressures than atmospheric pressure, or stated in another way, at boiling points other than the normal boiling point. At low pressures (vacuum) the latent heat increases slightly, and at high pres-

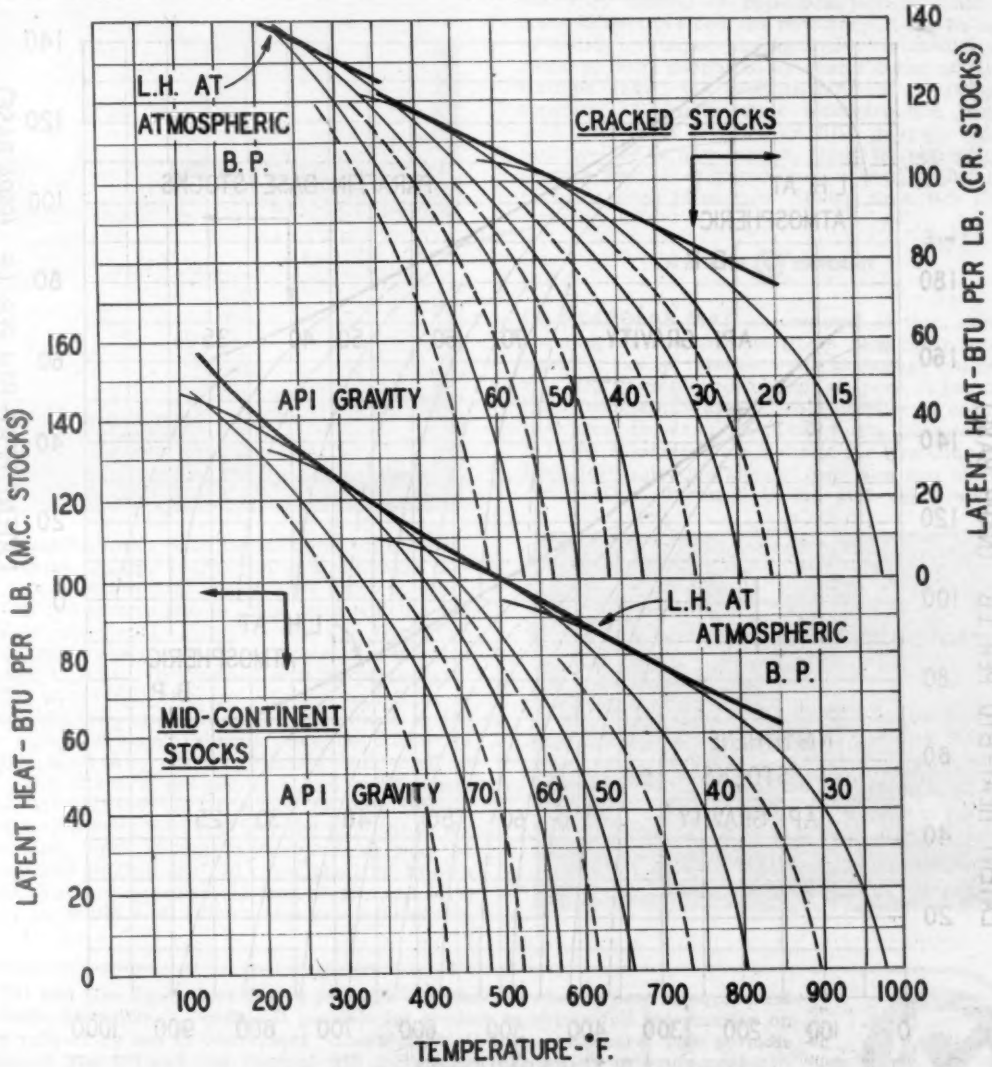

L.H. AT ATMOSPHERIC B. P.
CRACKED STOCKS
API GRAVITY 60 50 40 30 20 15
L.H. AT ATMOSPHERIC B. P.
MID-CONTINENT STOCKS
API GRAVITY 70 60 50 40 30
LATENT HEAT-BTU PER LB. (M.C. STOCKS)
LATENT HEAT-BTU PER LB. (CR. STOCKS)
TEMPERATURE-°F.
0 20 40 60 80 100 120 140 160
0 20 40 60 80 100 120 140
100 200 300 400 500 600 700 800 900 1000

Fig. 1

No. 43 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

sures it drops off quickly, becoming zero at the critical point of the material. Pressures are not shown on the figures but it may be determined by means of The Refiner's Notebook No. 38 (April 21).

Examples: A 60° A.P.I. Mid-Continent oil that boils at 240° F. has a latent heat of 132° F. (Fig. 1). If it were vaporized at a high pressure, a pressure high enough to make it boil at 560° F., it would have a latent heat of only 12 B.t.u. per pound.

A 17° A.P.I. cracking-plant recycle is being vaporized at 780° F. It would have a latent heat (Fig. 1) of about 68° F.

TENTATIVE SCHEDULE OF TOPICS

The subject of vaporization has been explored in:

No. 24—December 30, Laboratory Crude Distillation.
No. 34—March 17, Flash Vaporization.
No. 37—April 14, Flash Curves.
No. 38—April 21, Vapor Pressure.
No. 39—April 28, Vaporizer Steam.
No. 43—This Issue.
No. 48—June 30, Tower Temperatures.

Other recent topics and those immediately ahead are:

No. 40—Heating Liquid Oils.
No. 41—Stripping Steam.
No. 42—Heating Oil Vapors.
No. 44—A.S.T.M. vs. True Boiling Point Curves.
No. 45—Tower Balances.
No. 46—Types of Reflux.
No. 47—Vapor Volume and Molecular Weight.
No. 48—Tower Temperatures.

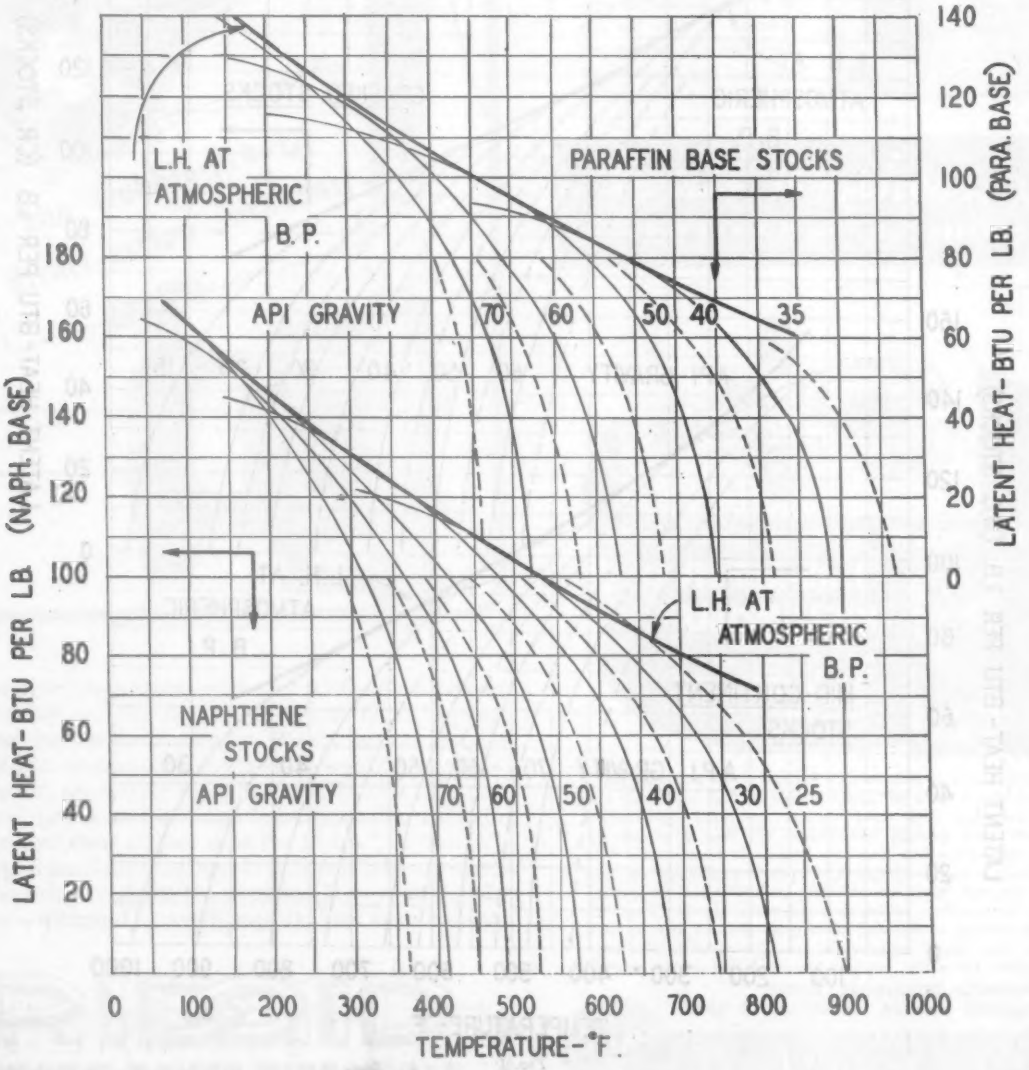

L.H. AT ATMOSPHERIC B.P.
PARAFFIN BASE STOCKS
API GRAVITY 70 60 50 40 35
NAPHTHENE STOCKS
API GRAVITY 70 60 50 40 30 25
L.H. AT ATMOSPHERIC B.P.
LATENT HEAT-BTU PER LB. (NAPH. BASE)
LATENT HEAT-BTU PER LB. (PARA. BASE)
TEMPERATURE-°F.
0 100 200 300 400 500 600 700 800 900 1000
20 40 60 80 100 120 140 160 180
0 20 40 60 80 100 120 140

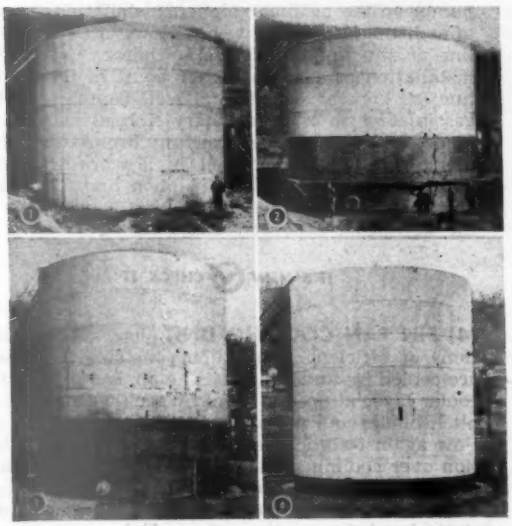
Fig. 2

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Kenneth B. Barnes

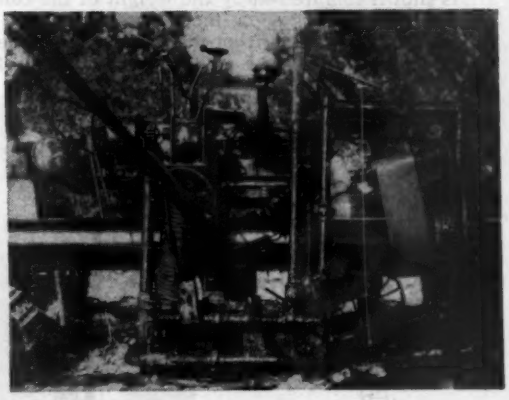
(1) MUSHROOM TECHNIQUE for enlarging storage tanks is new method by which liquid storage capacity may be increased without dismantling the original structure. The old tank is literally boosted to new capacity height. New rings are added at the base by a patented process which makes use of virtually all of the original structure



in assembled form. Such reuse, along with utilization of the original foundation and minimum dislocation of connections, contributes much to economy of the process and to speed with which a job may be completed. Providing for the first time an alternative to new tank construction to increase storage capacity, the method will be particularly useful where facilities are crowded and there is room only for expansion upward. As much as 100 per cent additional capacity may be added by Stacey men, who cut the existing tank shell at the base, add new radial plates, and build a new shell around the old structure to give desired height. Water is then run into the tank up to the new shell level, so that compressed air may be introduced to float the old cover shell up to new level. Various controls hold tank steady and level to ⅛ in. while 4-in. filler plates are inserted between the shells, and the two units are tack welded in place. When air pressure is released, and the water drained from tank, the two shell sections and fillers are completely seal welded on the outside. Inside, the old shell is trimmed and welded at intervals around its circumference, and the enlarged tank is ready for connections and service. Originally developed to obtain better buoyancy control of petroleum-storage tanks in areas subject to flood, the new method can be used to build up tanks having either umbrella-type roofs, or roofs supported by center columns. Illustrations show: (1) original tank of 300,000-gal. capacity; (2) intermediate reconstruction period with new rings in place on fifth day; (3) raised tank welded to new section, ready for painting on seventh day; (4) enlarged tank, now of 425,000 gal. capacity, back in service. *Stacey Bros. Gas Construction Co.*

IT'S NEW CHECK IT

(2) FIBERGLAS MAT is composed of thin, porous sheeting of bonded glass fibers. Originally developed for use as retainer mats in storage batteries and widely employed for that purpose, it has now been successfully applied to a number of entirely new uses. For example, in roll form, Fiberglas mat is being employed as a material for wrapping pipe lines for protection against corrosion and electrolytic action. Pictured is the mat being applied



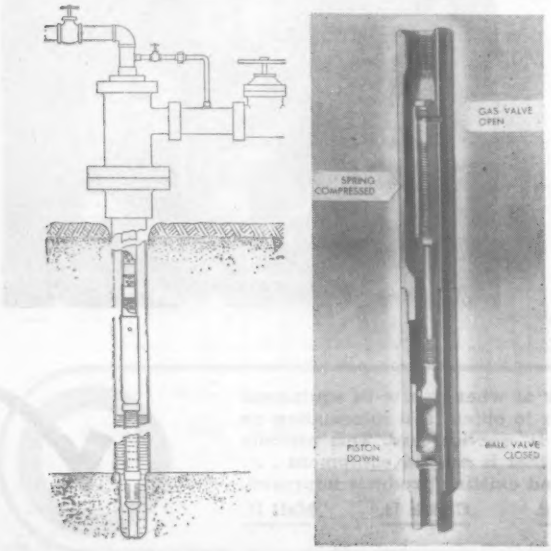
The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

as a carrier for an asphalt-bitumen coating on a Texas oil line. The Fiberglas is being wrapped on as the first layer after the coating has been applied to the pipe. There is full impregnation of the coating into the wrap. More than 4,000 ft. of 10-in. pipe were wrapped per day in this operation. The glass fibers are noncorrosive to metals, have negligible moisture pickup. Tensile strength is preserved through wide range of temperatures and exposure to organic solvents and soil acids. The millions of fine intertwined glass fibers reinforce a large amount of bitumen or coal-tar coating for a given thickness of wrapping. Fiberglas mat is also used as a base material for gaskets and sheet packing. The mat acts as a carrying medium for synthetic resins suitable for applications requiring resistance to heat, oil, and acids. Glass-base gaskets now being manufactured show high-pressure resistance, good chemical durability, and little flow under flange pressure. Mats are produced in thicknesses ranging from 0.010 to 0.050 in., widths of 22 and 36 in., roll lengths of 150 and 300 ft. A sample will be sent gratis. *Owens-Corning Fiberglas Corp.*

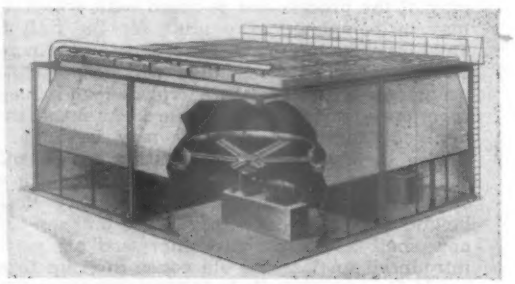
IT'S NEW CHECK IT

(3) BALDWIN-DRESSER SURGE PUMP incorporates few moving parts and unusual operating cycle. Efficiency and ease of operation of the pump are reported to have been proved by field tests over several years. Depending upon field conditions, gas pressure, and well depth, field tests have shown the ¾-in. size can easily handle 30 to 40 bbl. of water per day; the 1-in. size 80 to 100 bbl., the 2-in. size as much as 600 bbl. each day. Operation is simple and entirely automatic. To start the pump requires only the opening of a small valve at the well head; closing the valve stops it. Referring to the photograph, the spring is shown compressed by the weight of the column. The gas valve is open, the water inlet at the bottom is closed. Gas from the casing enters the gas valve and utilizes the well-known principle of the aerated siphon in step with a surge recurrently induced in the siphon line. Pressure in the column is reduced, expansion of the spring closes gas valve, the ball valve opens, and more liquid is admitted. This cycle repeats many times per minute, the number dependent on well depth and gas pressure. Gas flow is interrupted at the start of each liquid surge. The surge is trapped at its maximum height, and at that instant, the gas inlet is reopened. By limiting the period of gas flow into the siphon tubing to the moment a maximum column of liquid is trapped in the tube above the pump, the velocity of the gas flow is retarded. This increases lifting efficiency by reducing frictional resistance between the fluid and tube. The lower gas velocity further increases efficiency by allowing more time for greater isothermic expansion of the gas before it finally escapes from the siphon line. This simple yet efficient surge pump operates at a low gas-liquid ratio. The low ratio is uniform, showing almost no change as the liquid level in the well falls. Field tests have shown ratios as low as 127 cu. ft. of gas per bbl. of salt water pumped from a 950-ft. well. The B-D surge pump, unlike ordinary siphon installations, maintains lifting efficiency without lowering the siphon line as the liquid level falls, thereby permitting installation at a much higher point in the siphon line (as high as 1/3 of total well depth) than the gas inlet ports of an ordinary siphon installation. Made entirely of acid-resisting bronze, the few moving parts are enclosed in a working barrel which is connected into the siphon line. There are no sucker rods, cables, or moving connections to the well head. *Dresser Manufacturing Division.*



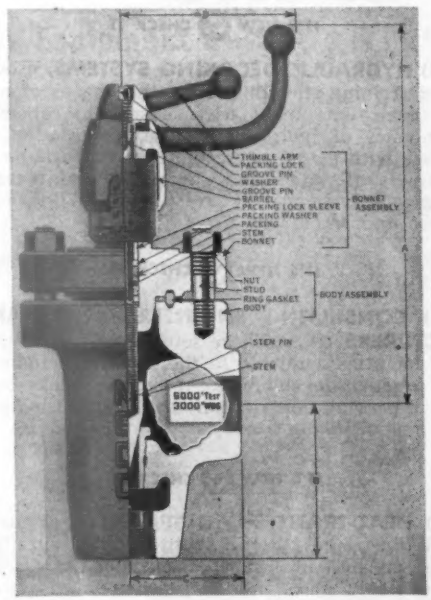
IT'S NEW CHECK IT

(4) FIN FAN COOLING UNIT has cooling sections of efficient K-fin tube construction. These are cooled by forced draft. The air is fed from the cooler layer at ground level by fans with variable-pitch blades and variable-speed drive. Vertical air flow against static head assures even air distribution over cooling surfaces. The units are designed for pressures to 5,000 psi. and temperatures to 1,500° F. Coils are located to provide sufficient static head for pump suction. Tubes can be removed and replaced quickly; all mechanical equipment is readily accessible from the ground. The



Fin Fan equipment embodies the combined experience and engineering of Griscom-Russell Co. and Fluor Corp., Ltd. Typical new installations, following more than 5 years' research and development, include: Fin-Fan steam condenser in a Texas gasoline plant; 7½ million cubic feet per day gas cooler for a western oil company; jacket water cooler in compressor station of a midwestern utility; still overhead condenser in a California gasoline plant; amine, CO_2 and H_2S cooler in a New Mexico plant. *The Fluor Corp., Ltd.*

(5) NATIONAL TYPE "D" MICRO-CHOKE is a thoroughly modern design embodying many new features. The rugged adjusting and indicating mechanism is, in principle, like a micrometer. Very fine, accurately readable adjustments are possible throughout the full orifice-opening range of the choke. Rotation of the thimble arm positions the choke tip, while equivalent orifice diameter reading is made from the indicator barrel which has black graduations on yellow background. The unique stem locking and packing arrangement allows choke adjustment while under pressure without servicing the packing. The packing lock arm is turned only enough to permit easy movement of the thimble arm to the desired position, after which the packing lock arm is tightened to relock. The choke stem packing is oil-resistant plastic; the hardened and ground stem tip and seat have high erosion-resistance factors. Contour design of tip and seat keeps cutting action to minimum. Construction permits conversion from an adjustable choke to a replaceable flow bean type. The bonnet, adjusting, and indicating mechanism can be removed as a unit and replaced with a blind flange. The choke seat can be replaced with a solid flow bean. Further, the removed parts may be reinstalled in any other Type "D" body, regardless of test pressure rating or outlet specification, thus realizing maximum in interchangeability and salvage value. Bodies are supplied with A.P.I. line pipe threads or flanged outlets in a range of sizes and test pressures to meet requirement of operating conditions. *National Supply Co.*

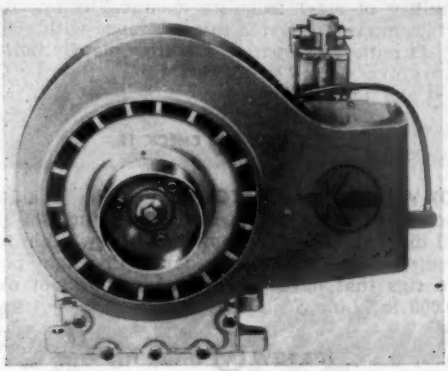


IT'S NEW CHECK IT

(6) SNATCH BLOCKS, with exclusive locking feature. A compact and sturdy all-steel block, with large bearing diameter and pressure lubrication. New locking feature permits threading of the line without complete removal of locking pin, which is not detached from block except for replacement. Illustration shows (left) closed, and (right) open block. The double movement of swivel-hook assembly eliminates leverage or undue strain. Made in 6-in., 8-in. and 10-in. sheave diameters. *Johnson Block Co.*

IT'S NEW CHECK IT

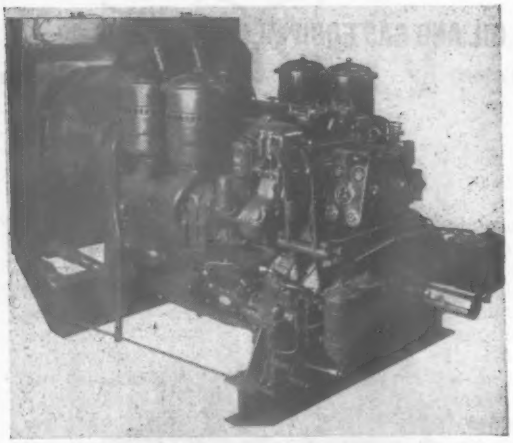
(7) LIGHT-WEIGHT 5-HP. ENGINE, called the "Busy Bee," Kinner Model AB-3, is an air-cooled, four-cycle, L-head engine rated 5 hp. at 2,600 r.p.m., but develops 6 hp. at 3,250 r.p.m. The single cylinder is horizontal and detachable, making maintenance easier. Bore is 2¾ in., stroke 3 in.



The whole unit requires only 2.4 cu. ft. of space. Termed the lightest engine in its horsepower class, aluminum alloy is used in crankcase, piston, head, crankcase cover, and rear cover. Bearing surfaces are large, with bearing pressure kept low. Full pressure lubrication is supplied by a positive, high-pressure oil pump. Model is the latest of 26 years of engine manufacturing experience. *Kinner Motors, Inc.*

IT'S NEW CHECK IT

(8) G M 2-CYCLE DIESEL ENGINES designed around a host of brand-new features are now in heavy duty rotary drilling service in West Texas, New Mexico, and Oklahoma. Outstanding is the weight factor, the twin 6-71 unit pictured weighing only 5,300 lb. Rated at 260-hp., this is less than 20 lb. per hp. A companion is the still larger



520-hp. quad 6-71. The well-known G M unit type injectors fit in the cylinder head, and both meter and inject the fuel into the combustion chamber. Exhaust gases from the two exhaust valves in each cylinder are swept out by a Roots type blower, and at the beginning of the compression stroke each cylinder is charged with fresh clean air. *Detroit Diesel Engine Division, General Motors.*

IT'S NEW ✓ CHECK IT

TRADE LITERATURE

(9) HARDENABILITY CALCULATOR. A new circular slide rule for computing approximate hardenability of steel from its chemical composition and grain size, prepared in accordance with standard formulas. Prepared for free distribution to those interested. *The Timken Roller Bearing Co., Steel and Tube Division.*

IT'S NEW ✓ CHECK IT

(10) WEIGHT INDICATORS. A folder available describing full line of weight indicators for oil-well drilling. The "Shipbuilder" is new scale featured, which is especially adapted for light portable rigs that have a working load of not over 100,000 lb. *Line Scale Co., Inc.*

IT'S NEW ✓ CHECK IT

(11) SPINNING CATHEAD. An engineering booklet, with cutaway drawings, part lists, and instructions on reducing cathead breakdowns. *Foster Cathead Co.*

IT'S NEW ✓ CHECK IT

(12) V-BELT SHOCK ABSORBERS. New booklet describes how these absorbers are made to fit bottom of V-belt pulley grooves to provide a firm but resilient cushion for belts. *Baroid Sales Division, National Lead Co.*

IT'S NEW ✓ CHECK IT

(13) PUMP MANUAL. A very complete booklet on pumps for every type of service, containing detailed engineering drawings, specifications, prices, etc. Include duplex, single-cylinder, side-pot power pumps, condenser pumps, salt-water pumps, etc. Contains 14 pages of detailed pump engineering data. *McGowan Pumps, Division of Leyman Manufacturing Corp.*

IT'S NEW ✓ CHECK IT

(14) HYDRAULIC DECOKING SYSTEMS, a booklet describing and illustrating this means of moving coke, equipment used, coke pile collection, economics of hydraulic coke transportation, together with actual operating data. Hydraulic decoking is offered as labor-saving and maintenance-saving investment at refineries. *Worthington Pump and Machinery Corp.*

IT'S NEW ✓ CHECK IT

(15) CONSULTING ENGINEERS AND MANUFACTURERS. A brochure setting out organization and facilities available to the petroleum industry for product development, research, patent services, representation, or manufacture of oil-industry equipment. *Engineering Laboratories, Inc.*

IT'S NEW ✓ CHECK IT

(16) HEAT-TRANSFER EQUIPMENT. Bulletin. Well illustrated bulletin, with detailed specifications, on full line of heat exchangers, heaters, coolers, coils and bends of pipe, pressure vessels, and prefabricated plate products. *The Whitlock Manufacturing Co.*

IT'S NEW ✓ CHECK IT

(17) PUMPING UNITS: REDUCTIONS GEARS. Leaflets available describing heavy-duty twin-crank pumping units, and double reduction gears. Both well illustrated, with schematic drawings, specifications, and operational details. *Oil Well Supply Co.*

IT'S NEW ✓ CHECK IT

(18) SUPER REFRACTORIES. Well-engineered bulletin, with physical characteristics, installation guidance, types of refractories, and discussion of plant performance records. *The Carborundum Co.*

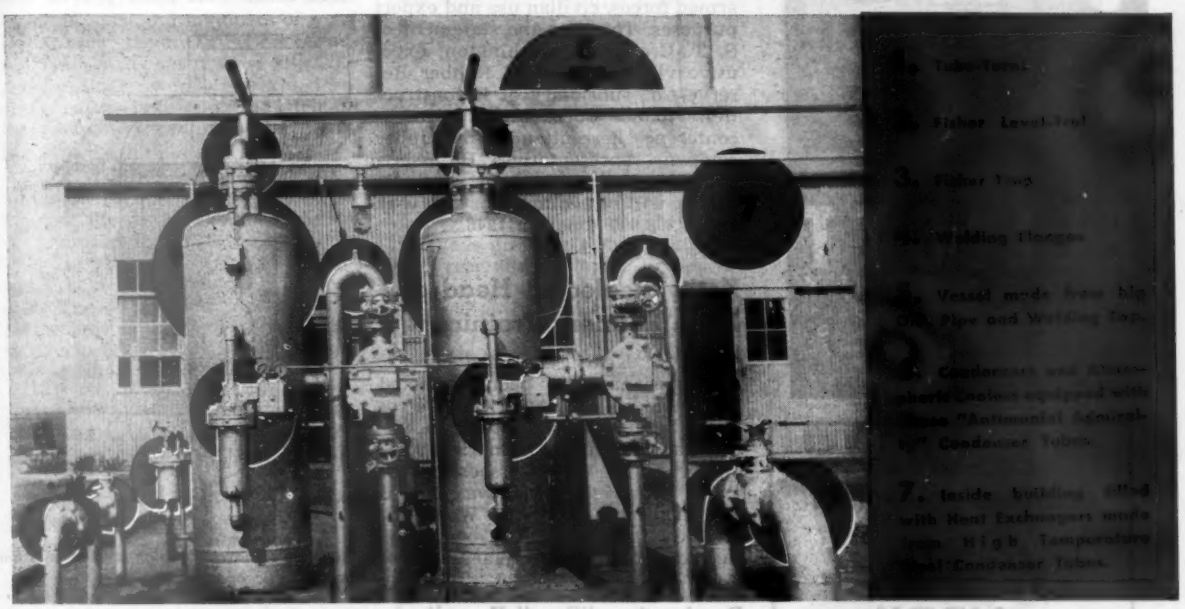
IT'S NEW ✓ CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

Here's HOW Vinson SUPPLY COMPANY Fits in the Picture

All this Equipment was FURNISHED FROM STOCK by Vinson Supply Co.



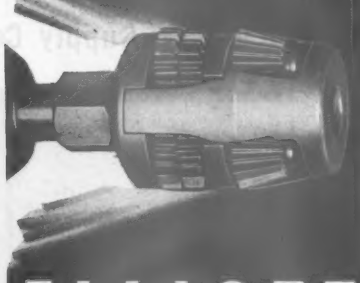
Service that COVERS the Mid-Continent

Supply Headquarters for the Refiner

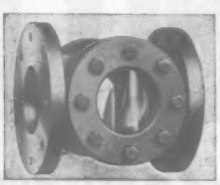
VINSON SUPPLY CO

and Natural Gasoline Manufacturer

DALLAS • TULSA • ODESSA

TOUGH CLEANER
. . . for tough tube cleaning jobs.
New 1100 Series motor, ball-bearing, faster, completely lubricated. Cutter heads more rugged and enduring. Write for bulletin.

ELLIOTT
COMPANY
Tube Cleaner Dept.
SPRINGFIELD, O.
Plants in Jeannette, Pa., Ridgway, Pa., Springfield, O., Newark, N. J.
District Offices in Principal Cities
Y-240

OIL and GAS
BURNING EQUIPMENT
NATIONAL
AIROIL
BURNERS
1236 E. Sedgley Ave.
PHILADELPHIA 34, PENNA.

Full View
FITTINGS

Bulletin 43A covers the complete line.
HENRY E. JACOBY, M. E.
207 E. 42nd St., New York 17, N. Y.

REFINING

Synthetic-Rubber Demand Exceeds Output Capacity

ST. LOUIS.—Manufacturers of synthetic rubber must provide 124 per cent of the over-all rated capacity of the country's plants for 1945 and 145 per cent of that for 1946 to meet the requirements of the armed forces, civilian use and export purposes. This was the statement of S. T. Crossland, Washington, executive vice president of Rubber Reserve Co., subsidiary of Reconstruction Finance Corp., before a safety conference here attended by rubber company representatives. He asserted 1,000,000 long tons of synthetic rubber will be required for this year and 1,200,000 tons for 1946.

Keaty Reelected Head of A.P.I. Refinery Training

Tom S. Keaty, Standard Oil Co. of Louisiana, has been reelected chairman of the American Petroleum Institute's committee on vocational training in refineries. J. S. Mallory, Tide Water Associated Oil Co. in Drumright, Okla., was elected vice chairman, and John Woodruff, of the University of Texas, was elected permanent secretary.

Production "Bug" Expelled By Inert Tower Packing

PHILADELPHIA.—An evil "bug" confronted engineers of The Atlantic Refining Co. when it undertook volume production of urgently needed 100-octane gasoline about 3 years ago. The bug originated in part from refinery equipment that had not been designed for the job and in part from the high-sulfur crude used.

The production process involves passing oil vapor through a catalyst, under pressure. The catalyst chamber is approximately 25 ft. high and 6 ft. in diameter. The vapor enters the chamber at the top, passes through the catalyst, and out at the bottom. The mixture of iron sulfide, scale, coke and carbon particles entrained in the vapor formed a crust in the top stratum of the catalyst, preventing free flow of the vapor.

Flow could be maintained only by increasing the pressure. When the pressure limit had been reached it was necessary to clean out and repack the chamber with new catalyst, even though the old catalyst was still active. It was decided that an inert tower packing material of the proper physical structure as a filter would provide a remedy.

Fiberglas tower packs were selected, because Fiberglas is inert, because the glass fibers are nonhygroscopic, and because of the large surface area. This filter proved satisfactory. Interlaced glass fibers entrap the entrained particles, but permit a free flow of vapor for a longer time than the catalyst itself remains active.

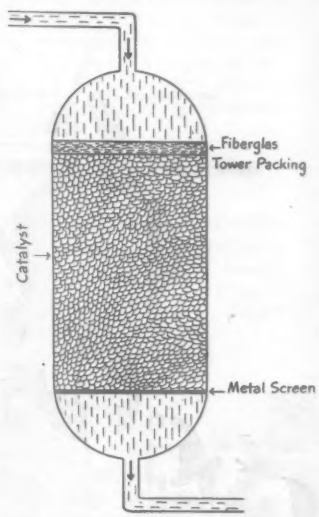


Diagram of how Fiberglas is used in Atlantic catalytic operations

The tower packing has at least doubled the length of the run, according to Atlantic's engineers, and has materially speeded production.

Continental Sells Western Facilities to General

PONCA CITY, Okla.—Continental Oil Co. has sold 65 bulk marketing plants and 54 retail service stations in Arizona, Washington and Idaho to General Petroleum Corp. for a consideration understood to be more than $1,500,000. This transfer, according to Harry J. Kennedy, vice president in charge of marketing, reflects a new emphasis on the economics of gasoline distribution and an expectation of vigorous postwar competition.

"Continental has been at a growing economic disadvantage in this

marginal area," Kennedy said, "and is concentrating its marketing investment in territory where it is a fully integrated operator and a sound, original supplier. All of Continental's nine refineries lie east of the Rocky Mountains. General Petroleum, as a major primary producer and supplier on the Pacific Coast, has a naturally superior supply and transportation situation for its own gasoline in the area in which it will expand its marketing operation by the purchase of these Continental properties."

Visitors Tour New Unit of Tide Water Associated

LOS ANGELES. — Local leaders, civic officials, and members of service clubs of communities surrounding Tide Water Associated Oil Co.'s Avon refinery were entertained recently at a luncheon and tour of the company's new catalytic cracking unit.

T. O. (Tom) Edwards, Jr., superintendent of the Avon refinery, explained the fluid catalytic process of manufacturing 100-octane gasoline. The first unit of the $20,000,000 cat cracker was installed 4 years ago. The completed plant, largest single unit of its type in the world, is now producing 15 times the volume of 1941.

Tighter Curb Clamped on Fuels Needed by Navy

CHICAGO. — A more rigid curb was imposed on production and distribution of kerosene and distillates in District 2 last week, when E. J. Bullock, director - in - charge, Petroleum Administration for War, fixed quotas for replacements. Seventeen refiners were directed to provide specific quantities of the fuels to 13 other refiners in the district. The quantities and the identity of the refiners involved were not made public.

The action was necessitated by increased requirements of the U. S. Navy. Effective May 1 and until the Pacific war is terminated the Navy will need at least 50,000 bbl. daily of several types of fuels. District refiners had been furnishing about 30,000 and after a recent conference at Chicago it was decided that this volume could be increased only slightly by revision of deliveries of the products on existing contracts.

In the telegrams sent to refiners, Bullock said: "It should be understood that arrangements for compliance with this schedule take precedence over other customer commitments."

Argentina to Receive Fuel Oil in Return for Seeds

WASHINGTON. — The United States has agreed to provide Argentina with 3,750,000 bbl. of fuel oil this year and the same quantity in 1946, receiving in return linseed and other vegetable-oil seeds of total caloric value equal to that represented by the fuel oil. The exchange will be made under an agreement signed in Buenos Aires, where the United States will purchase all exportable surpluses of Argentine linseed and linseed products and of vegetable-oil seeds and their products.

A United States spokesman said quantities covered by the agreement could vary, depending on such factors as linseed crop yields and the availability of shipping space.

Faced with a serious fuel shortage, Argentina in recent years has been crushing linseed to extract oil for use as fuel and its exportable surplus has shrunk.

The fuel oil price that will serve as basis for the barter will be the current one at the port of embarkation and in no case will exceed the equivalent international price.

Court Decision on Pricing System Is Under Way

Attorneys for refiners and natural - gasoline manufacturers are studying the recent decision of United States Supreme Court in which the basing-point system employed by Corn Products Refining Co. was found to be in violation of the Clayton Act. Similarity between the pricing system in question and those long used in the oil industry has given rise to a belief in some quarters that the Group 3 and other basing-point formulas may have to be changed. Opinion thus far expressed is divided.

LET JOHN FIELD-MAN HELP YOU SOLVE YOUR NEXT WATER CONDITIONING PROBLEM!

Call JOHN FIELD-MAN ON YOUR NEXT WATER CONDITIONING JOB

LELAND HAMNER CO.

P. O. Box 1065 · Capitol 9758 · Long Distance LD 2175

2211 PRESTON AVE., HOUSTON, TEXAS

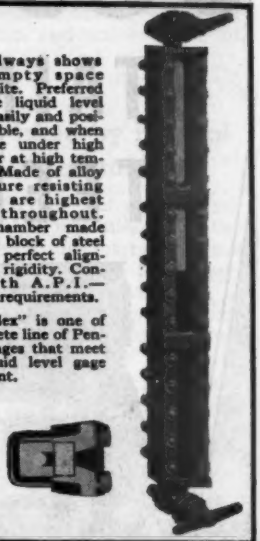
PENBERTHY

"REFLEX"

DROP FORGED STEEL LIQUID LEVEL GAGES

Liquid always shows black—empty space shows white. Preferred where the liquid level must be easily and positively visible, and when liquids are under high pressure or at high temperature. Made of alloy temperature resisting steel and are highest quality throughout. Liquid chamber made from solid block of steel to assure perfect alignment and rigidity. Conform with A.P.I.—A.S.M.E. requirements.

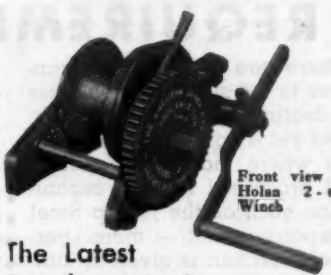
The "Reflex" is one of the complete line of Penberthy Gages that meet every liquid level gage requirement.



PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

IT'S NEW — THE HOLAN 2-TON WINCH



Front view of Holan 2 - ton Winch

The Latest Development In Compact, Easily Operated Winches — Tops In Quality

Small and compact, this winch is exceptionally easy to operate and very efficient. Two speed ratios permit handling heavy loads at slow speeds and light loads at high speeds. Perfect control is assured for raising load. When lowering load, control is secured by a single shoe hand brake that has sufficient capacity to hold full load. Full rated load is 4000 lbs., but each winch is tested at factory by applying a load of approximately 6000 lbs.

Write for Detail Information

THE AMERICAN COACH & BODY CO.

9307 WOODLAND AVE. AT E. 93RD ST.

CLEVELAND 4, OHIO

Jessop STAINLESS STEELS

WILL MEET *your* REQUIREMENTS

★There are numerous advantages to the stainless steel user in dealing with a moderately sized yet a complete producing unit where material is melted and processed by one organization such as the Jessop Steel Company plant — more personal attention is given to individual orders; facilities, staff and schedules are prepared to meet severe specifications and special requirements; and the wide experience of the personnel assures the exacting user valuable and expert assistance in solving problems.

No matter what your specific problem—whether it is the selection of the proper analysis, fabrication, or quick delivery—we invite you to discuss it with us. No obligation, of course.

JESSOP STAINLESS STEELS ARE AVAILABLE AS FOLLOWS:

- BARS
- BILLETS
- SHEETS
- STRIP
- PLATES
- CASTINGS
- SPECIAL SHAPES
- CIRCLES
- RINGS
- FLANGED AND DISHED HEADS
- CENTERLESS GROUND AND COLD DRAWN BARS

JESSOP STEEL CO.
HEAD OFFICE AND WORKS
WASHINGTON . . PENNA.
Established 1901

V-25-1 GAS FUEL GOVERNOR

GENERAL CONTROLS' V-25-1 Gas Fuel Governor, available in ⅜" to 3" I.P.S., will throttle gas lines according to the boiler pressure applied to the diaphragm. The best materials and advanced design are incorporated in this control, such as ball bearing thrust adjustment, ground and polished non-corrosive stems, low friction packing gland seal, multiple calibrated springs, and high lift for maximum capacity. For butane, natural or manufactured gas.

For further information write the nearest Factory Branch, Distributor, or direct to

GENERAL CONTROLS
801 ALLEN AVENUE — GLENDALE 1, CALIF.

FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO
KANSAS CITY • NEW YORK • DALLAS • DENVER • DETROIT • CLEVELAND
HOUSTON • SAN FRANCISCO • SEATTLE • PITTSBURGH
DISTRIBUTORS IN PRINCIPAL CITIES

Industrial SUPPLY COMPANY

ISC

HIGHEST QUALITY LINES

Through selective buying, we can offer you the "Best There is and The Largest Variety."

WILSON ROTARY RIGS
FLUID PACKED PUMPS
PITTSBURGH PIPE
CONTINENTAL ENGINES

Main Offices
500 EIGHTH ST., WICHITA FALLS, TEXAS

STORES: Wichita Falls . . . Electra . . . Kamay Turnertown . . . Freer.

BRANCH OFFICES: Dallas . . . Tulsa . . . Houston . . . Wichita Falls . . . San Antonio.

AT YOUR SERVICE AT ALL TIMES

Natural Gas

Weyland Made Chief of Arkansas Natural Units

A. H. Weyland, general superintendent of the Arkansas Natural companies since 1933, was elected to the office of vice president and general manager, and director, of the Arkansas Louisiana Gas Co., Arkansas Natural Gas Corp., Arkansas Fuel Oil Co., and Arkansas Pipeline Corp., on May 17 at a meeting of the board in New York City, the home office at Shreveport, announced.

The resignations of D. W. Harris, former president, and B. R. Muirhead, former treasurer, of the Arkansas Natural Gas Corp., were accepted by directors. Harris and Muirhead resigned to accept executive positions with another organization active in the refining end of the industry.

Joining the Cities Service organization in 1919 after graduation from Texas A. and M. College, where he received a bachelor of science degree in electrical engineering, Weyland moves into his new office with 26 years of experience in the oil business.

He first became a part of the Cities Service family in Bartlesville, Okla., when he accepted a position as junior engineer with the Empire companies. From 1919 through 1926 Weyland worked an assignments in Arkansas, Texas, Kansas, and Oklahoma. In 1925 he was transferred to El Dorado, Ark., and promoted to district superintendent of the Natural Gas & Fuel Co., in charge of drilling. In 1926 he was moved to Tullos, La., as district superintendent in charge of drilling and production in the Urania field. He became superintendent of oil production, Arkansas Natural Gas Co., in 1928 and moved to Shreveport. In 1933 he was again promoted and made general superintendent in charge of all operations of the Arkansas Natural and all associated subsidiaries; the Louisiana Oil Refining Corp., Arkansas Louisiana Gas Co., Arkansas Fuel Oil Co., Arkansas Pipeline Co., and the Little Rock Gas & Fuel Co. In 1936 Weyland was elected vice president of the Arkansas Louisiana Gas Co., a subsidiary of the Arkansas Natural Gas Corp.

Commission Explains Rules For Texas Gas Production

AUSTIN.—Proposed measures for tightening control of natural-gas production were explained to operators by the State Railroad Commission here last week at the statewide hearing on oil and gas proration. Final decision concerning adoption of suggested regulations would be deferred to the June meeting, Olin Culberson, commission chairman, said.

Existing regulations require operators to install devices for separation of gas from oil or liquid hydrocarbons "on order of the commission." They also require metering of production and maintenance of separate tanks for production from different horizons, "on order of the commission."

The proposed changes eliminate the clause "on order of the commission," making it mandatory for operators to install separating equipment, meters and necessary tanks. Culberson said royalty owners had complained, and that equipment now is available to carry out the change proposed.

Beauford Jester, commissioner, told operators that gas-conservation bills pending before the Texas legislature have been "so amended or pigeonholed" that enactment of any is unlikely. If none is passed, Jester said, it would be up to the commission to do the job. He asked cooperation of operators to show Federal Power Commission that federal regulation of gas in Texas is not only "unnecessary but unwarranted."

I.O.C.C. Meetings to Cover All Phases of Natural Gas

OKLAHOMA CITY. — Interstate Oil Compact Commission will inquire into all phases of the natural-gas industry during its 3-day quarterly meeting here June 14-16, Earl Foster, commission secretary, says. Nationally prominent authorities are to present papers and statements.

The commission, composed of 14 oil and gas-producing states, will have its committees at work all day June 14 in the Biltmore Hotel, headquarters for the meeting. Their formal reports will be presented at the general open session June 15. The meeting will close with a thorough inquiry, through the medium of a special panel and forum discussion, into the effect of recent U. S. Supreme Court decisions on the production and conservation of natural gas.

Mexicans Irked by Refusal To Provide Natural Gas

MEXICO CITY.—Refusal by Federal Power Commission of the United States to permit natural gas to be moved from Texas to Monterrey is described by newspapers of this city as "a rude blow to Mexican industry" and "an act of bad neighborliness by Texas."

Dispatches published in Monterrey assert that failure to get the 60,000,000 cu. ft. of natural gas sought will hamper Monterrey's industrial expansion.

Head of Exell Plant Goes To Post in Washington

C. C. Anderson, engineer-in-charge of the Bureau of Mines helium plant at Exell, Tex., since its opening in 1939, has been made assistant chief of the bureau's petroleum and natural gas division in Washington. He replaces H. C. Fowler, recently named supervising engineer of the bureau's petroleum experiment station in Bartlesville, Okla. The division to which he is assigned, headed by R. A. Cattell, supervises helium production.

Anderson joined the bureau staff in 1924 as an assistant chemist in Washington. Two years later he was transferred to the Fort Worth helium plant and since then he has been closely identified with the expanding helium production facilities. He superintended construction of the Exell plant.

While a member of the Washington staff, Anderson enrolled at George Washington University and in 1925 received a B.S. degree in chemical engineering. Previously he had been graduated with an A.B. degree from Albion College in Michigan in 1921, after which he was employed by a Houston oil refinery and later by the National Museum in Washington.

PENBERTHY
DROP FORGED STEEL
LIQUID LEVEL GAGES

Type "10"

Recommended for 750 lb. Hydrostatic Pressure

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

WHEN YOU WANT THE BEST IN PIPELINE CONSTRUCTION

Oklahoma CONTRACTING COMPANY DALLAS, TEXAS

SOUTH AMERICA
Apartado 1085
CARACAS, VENEZUELA

PIPE LINES

Texas Empire Awards Contracts for Loops

Texas Empire Pipe Line Co. let contracts to four firms for laying approximately 163.2 miles of 12-in. in nine loop sections between Sheldon, Mo., and Heyworth, Ill. Construction will start shortly after the arrival of pipe from the mills in June. Contracts were awarded as follows:

Sheehan Pipe Line Construction Co., 18.4 miles in one loop near Sheldon; Williams Brothers Corp., 35.7 miles in two loops between Lowry and Pisgah stations, also 36.9 miles in two loops between Pisgah and Center, Mo.; Sooner Construction Co., 36.4 miles in two loops between Center station, Mo., and Virginia station, Ill.; and H. C. Price Co., 35.8 miles in two loops between Virginia and Heyworth stations, Ill.

These loops will fill in between existing loops so as to provide a double 12-in. system between Sheldon and Heyworth.

Cities Service Seeks to Acquire Hugoton Line

A speedy decision by the Federal Power Commission is expected on the application of Cities Service Gas Co. to acquire a 231-mile natural-gas pipe line of an affiliated concern.

A hearing on the company's proposal to take over the line of the Cities Service Transportation & Chemical Co. between the Hugoton field, near Guymon, Okla., and Blackwell, Okla., has ended before a commission examiner.

G. W. Clark, gas company vice president, asked the examiner to speed up the decision if possible. As a result it was agreed to waive all oral arguments and filing of briefs.

Iraq Petroleum to Lay 620-Mile 16-In. Line

Iraq Petroleum Co. is reported to have reached a decision to build a second line parallel to the present system, running from Kirkuk to the Mediterranean. This will consist of a 620-mile 16-in. crude-oil line, which has been under consideration during the past year, for adding to the capacity of facilities put in operation in 1934 for transporting oil from the Kirkuk field in Iraq to Haifa and Tripoli on the eastern Mediterranean Coast.

In connection with Iraq Petroleum's project and that of Arabian American Oil Co. to lay a line of 24-in. and 26-in. diameter from Arabian oil fields to the Mediterranean there are numerous points to be settled by negotiation between the United States and British governments. These points are said to concern equal opportunities for oil companies of the two nations and for the economic progress of the Near East petroleum-producing regions.

Several Contracts Let For Reconditioning Jobs

Several reconditioning projects are being undertaken for lines of different types.

Work starts this week on 34 miles of 12-in. natural-gas line in Montana for Montana Dakota Utilities Co. which has contracted the job to W. A. Bechtel Co. El Paso Natural Gas Co. is reconditioning 3 miles of line with its own crew. Humble Pipe Line Co. is reported to have awarded work on the conditioning of approximately 40 miles of line in West Texas to several contractors.

Future of WEP Is Discussed

Preliminary to the O'Mahoney committee oil industry investigation, the future status of the two War Emergency Pipelines, Inc., systems is being discussed in Washington. Among the proposals advanced are those for auctioning the WEP lines to the highest bidder, disposing of them for natural-gas transmission or removing them from operation altogether so that they may be available as facilities only to be used in future emergencies.

Hearing Postponed on Gas Export to Canada

At the request of the Railroad Commission of Texas, the Federal Power Commission has postponed until June 20 in Washington, D. C., the hearing on the application of Panhandle Eastern Pipe Line Co. for authority to export gas from the

United States to Canada and for constructing facilities for handling gas for export in connection with its system from Texas to Detroit.

Federal Power Commission held further hearings beginning May 23 at Washington, D. C., on issues presented in Chicago from April 23 to April 26 resulting from: (1) Central Illinois' petition for an FPC order directing Panhandle Eastern to extend its facilities to establish a connection with the petitioner's distribution system near Mattoon, Ill., and (2) Kentucky Natural Gas Corp.'s application for authority to construct and operate about 20 miles of 6-in. line extending from a connection with Panhandle Eastern's lines near Tuscola, Ill., to a connection with Central Illinois' distribution system. In its application the Kentucky company stated it desired the facilities in order to supply Central Illinois with additional gas.

A further hearing has been required, the commission's order states, as a result of Central Illinois' amendment to its original petition. In this amendment, filed with the FPC May 3, 1945, Central Illinois asks for authority to construct and operate its own facilities connecting its system with that of Panhandle in case the FPC finds insufficient evidence to warrant ordering Panhandle Eastern to construct the connecting pipe lines.

C. S. FOREMAN COMPANY

General Contractors

PIPE LINES

20 West Ninth Street
Kansas City, Missouri

New

CATERPILLAR

REG. U.S. PAT. OFF.

D13000 ENGINES
IMMEDIATE DELIVERY
From Stock

OEHLERT

Tractor & Equipment Co., Inc.
Phone 1108 Salina, Kansas

Eastward Tank Car Records Are Broken

During V-E week an average of 555,208 bbl. daily of crude oil and petroleum products were moved into Atlantic Seaboard points by tank car to set a new eight-month record, according to an announcement by Deputy Petroleum Administrator Ralph K. Davies.

Every advantage of available transportation is being taken at present in anticipation of a marked drop in East Coast shipments as tank cars are shifted to West Coast runs to meet military demands. This drop, he declared, will come at a time when it is expected that few if any tankers will be available for moving civilian petroleum products to the Atlantic Seaboard.

The average tank-car movement into the East Coast area (PAW's District 1) for the week ending May 12 was the highest since the week ending September 2, 1944, when 564,436 bbl. a day were moved.

Improved handling of available cars throughout the territory and release of tank cars tied up previously by floods contributed to last week's record movements.

The inventory of home-heating oil on the Atlantic Seaboard was 6,210,000 bbl. on May 12, a decrease of 61,000 bbl. from the figure at the end of the preceding week.

"The improvement in tank car movements comes at a time when every gain in transportation is in the nature of a victory," Mr. Davies said.

"Among other considerations, military demands on oil for the Pacific war, as has been emphasized repeatedly, will be so high as to make the home-heating oil and kerosene situation critical for next winter, and, as a result of diversion of tankers from the East Coast civilian service to military service, we have been delayed in starting the stock build-up of these heating fuels. This must be completed during the summer in anticipation of winter needs.

"Tank cars will, of necessity, carry a large part of the burden added to overland transportation because of the tanker diversion. Every extra carload that can be moved is important and we trust that every individual connected with petroleum shipments will continue to do all that is possible to get the utmost out of the facilities that are available."

The "Big Inch" (24-inch) pipe line delivered 323,467 bbl. of crude oil a day to East Coast refineries last week as against 332,356 bbl. a day the previous week. Products delivered by the "Little Big Inch" (20-inch) pipe line averaged 231,016 bbl. a day compared with the previous week's daily average of 234,448 bbl.

"CLEVELANDS"

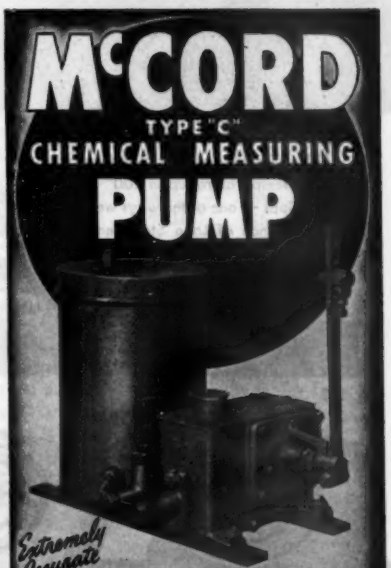
Forerunners of All Full Crawler Ditchers
ASSURE MAXIMUM RETURN ON YOUR INVESTMENT

From every angle — power, speed, durability — ease of handling and portability — "CLEVELANDS" have proven themselves, on the job, performers of a superior type.

THE CLEVELAND TRENCHER COMPANY
"Pioneer of the Small Trencher"
20100 ST. CLAIR AVENUE CLEVELAND 17, OHIO

McCORD

TYPE "C"
CHEMICAL MEASURING
PUMP



Extremely Accurate
DEPENDABLE

Accuracy of delivery in McCord chemical pumps is the result of a finely engineered design with a minimum number of parts. Dependability is insured because working parts are fully enclosed, protected from dirt and the elements. Specify McCord. For sale by National Supply Co.

Standard of the Oil Fields

McCORD

RADIATOR & MFG. CO., DETROIT, MICH.

HOT AND HOW!

CEMENT—'small change' in a well's total cost—protects the entire investment. That is why we PRE-TEST the performance of Lone Star Cements. Example — tests for strength after exposure to temperatures up to 200° F.

PRE-TESTED QUALITY — good reason for insisting on these Oil Man's Cements. Select the one that fits your well:

'STARCOR'* for deep wells, high strength, extra sulphate resistance. 'TEXCOR'* for deepest wells, high strength and extra sulphate resistance. 'INCOR'* for moderate-depth wells, earlier drill-out. LONE STAR CEMENT for all-around oil-field dependability. Continuing Oil-Well Cement Laboratory Research assures outstanding performance, today and tomorrow.

*Reg. U. S. Pat. Off.

HOT—AND HOW! Tests for strength after exposure to temperatures up to 200° F. for varying periods — one of the ways we PRE-TEST performance of Lone Star Cements.

LONE STAR CEMENT CORPORATION • DALLAS • HOUSTON

Exploration and Drilling

Week's Highlights

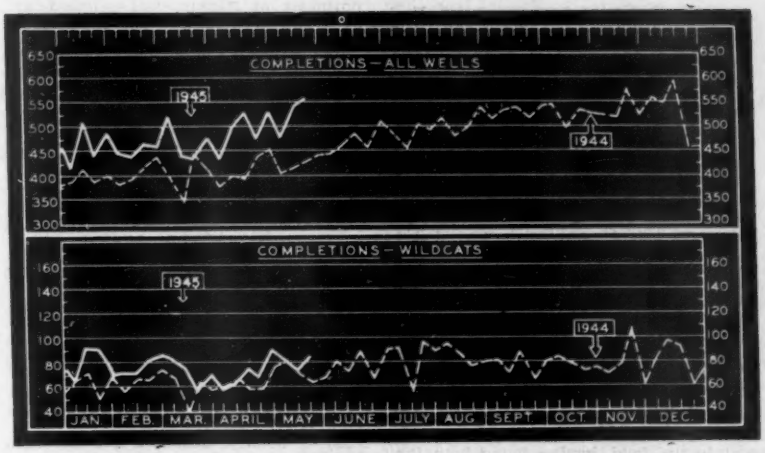
FLORIDA has a second oil well, and its first flowing well. Humble Oil & Refining Co. 4 Gulf Coast Realty Co., in 20-48s-30e, Collier County, is reported flowing 12½ bbl. per hour through a ¼-in. choke, 18 per cent salt water, oil about 20° gravity.

The new well is 8,000 ft. north of the original oil discovery in 29-48s-30e, in the Sunniland district. While drilling it picked up pin-point porosity in lime from 11,559-82 ft., and good porosity from 11,588-97 ft., the latter also being total depth. A drill-stem test at 11,549-97 ft., with a ⅜-in. top and ¼-in. bottom choke, using a 6,000-ft. water cushion, recovered water cushion, plus 5,990 ft. of 19.2 gravity oil, 10 ft. of salt water, and 30 ft. of salty oil-cut mud, with bottom-hole flowing pressure of 5,225 lb. The 7-in. casing was set at 11,564 ft., the well washed in.

The new well, producing from somewhere between 11,564-97 ft., is probably higher than the discovery, where pay, tentatively called the Glen Rose lime, is reported at 11,620-26 ft. A second test in this area was also drilled by Humble, in 30-48s-30e, west of the discovery well, and junked at 13,512 ft. The comparative performance of the three wells seems to indicate the discovery well was on the edge, with best prospects lying north and east.

The Sunniland development has all earmarks of a costly pioneering problem. The section from surface to pay zone is predominantly lime and dolomite. The pay zone is part of the Lower Cretaceous, which here consists of about 5,000 ft. of limestones and evaporates. Locally at least there is probably an important unconformity between the Lower and Upper Cretaceous. Northward up the Florida Peninsula, along the Ocala arch this 5,000-ft. wedge of Lower Cretaceous thins out until it disappears.

The geological section is a mixture of Caribbean and western United States Gulf Coast; being similar to Cuban and Mexican from the top of early Middle Eocene to the base of Lawson in Upper Cretaceous, thence similar to United States Gulf Coast sections down into the upper part of Lower Cretaceous.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended May 19, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
New York	17	0	*17	34	47,630	475	346
Pennsylvania	42	7	†34	83	147,426	1,395	697
West Virginia	1	12	1	14	38,386	295	174
Ohio	7	8	5	20	52,247	297	338
Indiana	3	0	1	4	8,185	59	84
Kentucky	4	1	2	7	16,054	137	223
Illinois	24	0	19	43	111,633	598	604
Michigan	8	0	11	19	43,284	286	210
Kansas	23	7	10	40	127,660	583	632
Nebraska, Missouri, Iowa	0	0	0	0	0	12	13
Oklahoma	28	2	21	51	194,370	877	594
Texas:	92	13	51	156	726,324	2,719	1,929
North Central	19	1	‡27	47	140,340	775	540
West	34	0	11	45	223,708	729	581
Panhandle	3	7	0	10	31,326	217	65
Eastern	0	0	1	1	7,445	119	120
Gulf Coast	29	3	8	40	270,947	630	330
Southwest	7	2	4	13	52,558	249	293
Louisiana:	2	2	5	9	60,748	345	272
Northern	0	2	2	4	13,019	112	104
Southern	2	0	3	5	47,729	233	168
Arkansas	3	0	2	5	23,749	64	80
Mississippi	2	0	8	10	72,524	130	41
Southeastern States	0	0	1	1	2,130	14	12
Montana	6	2	3	11	23,303	121	94
Wyoming	3	0	1	4	16,666	78	58
Colorado-Utah	0	0	0	0	0	12	11
New Mexico	5	0	1	6	16,677	189	154
California	33	1	6	40	147,134	891	729
Total United States	303	55	199	557	1,876,130	9,577	7,295
Total previous week	303	59	184	546			
Total May 20, 1944	229	46	107	382			

Service wells included: *17, †32, ‡1.

PERMIAN BASIN

Howard-Glasscock Pool Has New Deep Discovery

MIDLAND.—Continental Oil Co. D-1-133 W. R. Settles, Section 133, Block 29, W&NW Survey, is a new deep discovery well for the shallow Howard-Glasscock field in southern Howard County. It was plugged back to 9,140 ft. from total depth of 10,122 ft. Casing was perforated with 120 shots at 9,100-20 ft., believed to be in the Pennsylvanian. It was washed with oil and acidized with 1,000 gal. The well was allowed to clean into the pits for 15 hours. It then flowed 108 bbl. of 43° gravity oil in 4 hours through ½-in. choke on 2½-in. tubing. It is being tested further.

Ector County.—Shell Oil Co. 1-A Thomas, Ellenburger discovery in the TXL pool, gaged 1,547 bbl. of 44° gravity oil in 24 hours through ½-in. choke on 2-in. tubing at 9,843 ft. Phillips Petroleum Co. 1-A TXL, the first well in the TXL pool to flow from the Silurian and the second to develop Ellenburger production, ran a 60-minute drill-stem test at 9,774-9,800 ft., total depth. It flowed water blanket and mud in 20 minutes and started flowing oil in 30 minutes. It flowed into pits for 30 minutes and into tanks for 50 minutes, making 108 bbl. of 41.4° gravity oil at the rate of 130 bbl. for 1 hour. Operator is drilling ahead at 9,818 ft. The Texas Co. 1-B TXL, most southerly outpost to the field, having found both the Silurian and Devonian barren, is considered dry at 9,339 ft.

Gaines County.—Amerada Petroleum Corp. 1-A E. H. Jones, wildcat in the extreme northwest corner of the county, took a 60-minute drill-stem test in the lower Permian at 9,085-9,142 ft. Recovery was 450 ft. of slightly oil-cut mud, 2,500 ft. of oil and gas-cut mud, 5,320 ft. of 32° gravity oil and 630 ft. of oil-cut mud. On a 98-minute drill-stem test at 9,082-9,224 ft., 4,085 ft. of water, oil and gas-cut mud, plus 1,545 ft. of free oil, plus 1,270 ft. of water, oil and gas-cut drilling fluid was recovered. It was drilling below 9,245 ft. Humble Oil & Refining Co. 1-B Humble-Eubanks, 2½-mile northwest extension to the Eubank-Doss pool, took a 50-minute drill-stem test at 4,602-4,880 ft. and recovered 720 ft. of drilling mud with a slight odor of gas. It was drilling ahead at 5,681 ft. DeKalb Agricultural Association, Inc. 1 N. F. Colthrop, southeast offset to the Eubank-Doss pool discovery well, recovered 2,400 ft. of fluid showing some oil on a drill-stem test at 6,980-7,200 ft. Operator is still testing.

Upton County.—Humble 1 Parrott, wildcat in eastern Upton County, 18 miles northeast of Rankin, was acidized with 2,000 gal. of mud acid through perforations at 9,100-9,893 ft. and flowed 315 bbl. of 39° gravity oil in 6 hours through 17/32-in. choke. It is still being tested. Humble 1 Mrs. W. E. Gresham, wildcat 1 mile west of 1 Parrott, was drilling below 8,224 ft. in shale. J. W. Burleson & Sons 1 Burleson estate, wildcat 1½ miles north of McCamey, is dry at 3,152 ft. after having an increase of sulfur water at 3,150 ft.

WEST TEXAS WILDCAT FAILURES

Crane County: Kenwood Oil 1 Skelly-Univ., Sec. 17, Blk. 30, Univ. lands, between Dune and McElroy pools, elev. 2,700 ft., Yates 2,165 ft., dry, TD 3,370 ft.

Sinclair Prairie 1 Jennie McKnight, Sec. 6, Blk. B-22, PSL, elev. 2,836 ft., Devonian 7,915 ft., Silurian 8,855 ft., Simpson 9,205 ft., Ellenburger 10,330 ft., dry, TD 10,884 ft.

Crockett County: Ben Banner 1 Cox, Sec. 29½, Blk. 2, I&GN Sur., elev. 2,332 ft., dry, TD 2,000 ft.

Midland County: Seaboard and Standard of Texas 1 Faskin, Sec. 7, Blk. 37, T-2-S, T&P Sur., 13 mi. E Midland, elev. 2,675 ft., Yates 2,340 ft., dry, TD 5,004 ft.

Pecos County: G. F. Aldrich 1 Sun-Crockett, Sec. 26, Blk. 2, H&TC Sur., 2 mi. S Apco pool, elev. 2,371 ft., Yates 1,040 ft., dry, TD 2,305 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Vickers Petroleum Co. will drill a 4,500-ft. wildcat 3 miles west of the South Eunice field in Lea County. It is 1 Shell-State, 17-21s-34e. The Texas Co. has staked 2 C. H. Lockhart, 1½ miles southwest of 1 Blinebry, southwest offset to Gulf Oil Corp. 1 Drinkard, discovery well. It will be a Lower Permian test to 6,500 ft. in 18-22s-38e. No. 1 Blinebry plugged back and perforated with 72 shots at 5,580-95 ft. It is swabbing and testing. About 2 miles south of Gulf 1 Drinkard, DeKalb Agricultural Association will drill 1 Elliott, a 6,500-ft. test in 6-23s-38e.

Humble Oil & Refining Co. 2 Federal-Leonard, wildcat in the Dublin area of southeastern Lea County, drilling below 8,780 ft. in lime. Neville Penrose, Inc. 3 Hinton, wildcat 1 mile south of Gulf 1 Paddock, discovery well, on a 75-minute drill-stem test at 5,106-86 ft., recovered 265 ft. of oil and gas-cut drilling mud. It cored to 5,266 ft., total depth, set 2½-in. packer at 5,109 ft. and is swabbing.

DAILY AVERAGE PRODUCTION FOR WEEK

	May 19 crude oil	Distillate, allied products	May PAW quota all oils	May 12 crude oil
Alabama	450	.....	300	450
Arkansas	79,800	5,200	85,200	79,600
California	945,250	60,280	1,007,280	925,750
Colorado	10,450	.....	10,500	11,050
Eastern	63,300	6,600	73,800	63,700
Illinois	194,250	12,000	217,000	195,800
Indiana	12,650	.....	13,000	11,300
Kansas	271,300	4,200	278,200	270,900
Kentucky	26,600	2,200	33,200	27,100
Louisiana	370,900	42,000	402,000	370,900
North Louisiana	71,100	.....	.....	71,100
South Louisiana	299,800	.....	.....	299,800
Michigan	45,800	700	47,700	50,300
Mississippi	49,800	.....	53,000	54,250
Montana	23,550	300	23,300	23,550
Nebraska	900	.....	1,000	900
New Mexico	103,700	4,800	109,800	103,700
Oklahoma	385,400	28,500	396,000	385,150
Texas	2,176,150	162,000	2,332,000	2,176,150
East Texas	379,800	.....	.....	379,800
East Central Texas	138,200	.....	.....	138,200
North Central Texas	153,900	.....	.....	153,900
Texas Panhandle	90,000	.....	.....	90,000
West Texas	495,300	.....	.....	495,300
Southwest Texas	355,650	.....	.....	355,650
Texas Gulf Coast	563,300	.....	.....	563,300
Wyoming	102,550	3,200	115,200	101,750
Total United States	4,862,800	331,980	5,198,480	4,852,300
Change from previous week	up 10,500			

Total production January 1-May 19, 1945 ..... 663,429,950 bbl.
Same period last year ..... 618,637,811 bbl.

SOUTHWEST TEXAS

Goliad County Test Washed in, Is Cleaning

CORPUS CHRISTI.—Transwestern Oil Co. 1 Wm. Altman estate, wildcat 15 miles north of Goliad and 2 miles south of Slick field, in the B. P. Tumlinson Survey, Goliad County, was perforated at 7,640-50 ft. with 48 shots, washed in, and is cleaning through 3/32-in. choke with tubing pressure 125 lb. Total depth is 8,005 ft., with 5½-in. casing at 7,775 ft.

Arkansas Fuel Oil Co. 6 E. L. Wood, Runge field, Karnes County, on a 24-hour potential test flowed 122 bbl. of 37.8° gravity oil, no water, through 9/64-in. choke, tubing pressure 750 lb., casing pressure 1,400 lb. Gas-oil ratio 426 to 1, production from 12 perforations at 6,597-99 ft. Total depth is 6,723 ft., with 5½-in. casing at 6,645 ft.

Southern Minerals Corp. 2 Martinez Mercantile Co. in Falls City field, Karnes County, on a 24-hour potential test flowed 125.7 bbl. of oil, 10 per cent water, through ½-in. choke, tubing pressure 200 lb., gravity 48.5°, gas-oil ratio low, from 57 perforations at 4,645-66 ft. Total depth 4,666 ft., with 5½-in. casing set at 4,666 ft.

Navarro Oil Co. 1 E. L. Byrnes, wildcat, 9 miles southeast of Telferner, in T&NO Survey 6, Victoria County, was dry at total depth of 6,534 ft.

Dee Davenport 2 Annie Graves Dolph, wildcat 17 miles southeast of Tilden, in the J. Oppenheimer Survey, McMullen County, was dry at total depth of 1,943 ft. The No. 1 Dolph, in the same area, is drilling at 6,771 ft. and operator plans to go to 9,000 ft.

Sun Oil Co. A. T. Canales, Canales field, Jim Wells County, on a 24-hour potential test flowed 151.52 bbl. of 42° gravity oil through 7/64-in. choke, tubing pressure 1,740 lb., casing pressure 1,950 lb., gas-oil ratio 869 to 1, from 16 perforations at 7,229-33 ft. Total depth 7,235 ft., with 5½-in casing at 5,819 ft. and 4-in. liner to bottom.

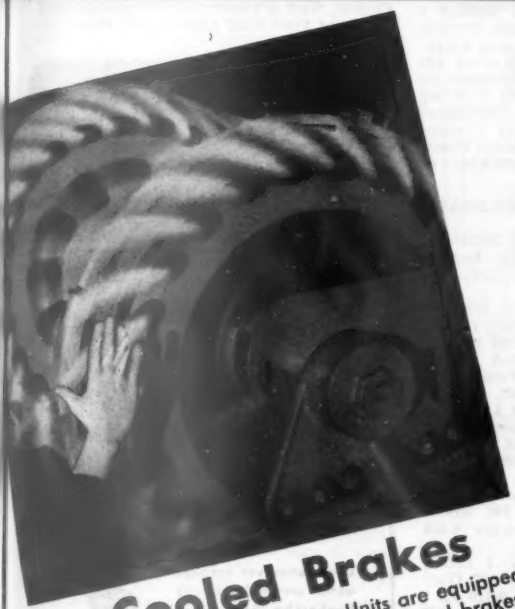
SOUTHWEST TEXAS SUCCESSFUL WILDCAT

San Patricio County: Oil discovery—Bridwell Oil Co. 1 Bertha C. Willman, in Delgado Grant, 1 mi. SW of Mathis, TD 4,563 ft., perf. 4,553-56½ ft., PT 132 bbl. day through 5/32-in. choke, gas-oil ratio 228, tubing pressure 410 lb., casing pressure 610 lb., gravity 22.5°, no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Duval County: Argo Oil 1 Dionicio Garcia, Jose Marcelo Hinduosa Grant, 3 mi. east of Crestonia, dry at 5,324 ft.

Jim Wells County: Sinclair Prairie 1 Florence S. Greenbaum, Magnolia Fig and Orange Colony subd., Blk. 17, east edge of Magnolia City, dry at 6,316 ft.



Air Cooled Brakes

All Allis-Chalmers Well Servicing Units are equipped with Cooper, patented, circulating air cooled brakes, which keep the temperature of the brakes BELOW the maximum operating temperature prescribed for the lining, thus assuring a high co-efficient of friction and BRAKES THAT HOLD.

for WELL SERVICING *and* DRILLING!

The Allis-Chalmers Model L Units are the most flexible and efficient pieces of equipment for servicing rods and tubing, bailing, swabbing, cleaning-out, well deepening and drilling with either rotary or cable tools.

The Model L SKID WINCH has a maximum line pull of 66,730 pounds. Available with either 52″ brakes, line capacity 15,030′ of ¾″; or 42″ brakes, line capacity 9,130′ of ¾″. Winch drum has EIGHT line speeds to 1,059 feet per minute at 1,200 engine r.p.m. This unit is also available in the A-C Model L Winch Tractor Unit. These units will service the deepest wells with ease and speed.

A Cooper Service Engineer will gladly submit detailed specifications.

FRED E. Cooper

Increase RESERVES AND PROFITS BY *Secondary Recovery*

EXPERIENCED PRACTICAL CONSULTING REPRESSURING AND WATER FLOODING PRODUCTION ENGINEERING SERVICE

- Preliminary Surveys
- Gas Measurements
- Bottom Hole Pressure
- Compressor Plants
- Installation
- Water Treating Plants
- Core Analysis
- Estimate of Results
- Valuations
- Supervision

PETROLEUM ENGINEERS
CABLE & STINE
WICHITA FALLS, TEXAS

ALTEN
Essex Pattern
IRON
LOCK COCKS

ONE OF OVER 300 ALTEN OIL FIELD PRODUCTS

See Composite Catalog for complete list or write us for catalog.

Fig. G-700

ALTEN'S
FOUNDRY and MACHINE WORKS
Established 1889 . . . . . Lancaster, Ohio
EXPORT OFFICE: 342 Madison Ave., New York 17, New York
TEXAS OFFICE: 45 San Jacinto St., Houston 1, Texas
Leading Supply Stores Carry All Alten Oil Field Equipment

Refugio County: United Production 1 Leopold, Veselka Bonnie View subd., Sec. "A", 5 mi. SE of Woodsboro, dry at 6,564 ft.

Victoria County: Navarro Oil 1 E. L. Byrnes, T&NO Sur., 9 mi. SE of Telferner, dry at 6,534 ft.

N. CENTRAL TEXAS

Offset to Jack County Discovery Tests Oil

WICHITA FALLS.—Continental Oil Co. 1-A Cherrynomes, east offset to the discovery well in the Cherryhomes Bend conglomerate oil pool in southeastern Jack County, tested 61 bbl. of oil and no water in 7 hours through a ½-in. choke at 5,032-54 ft. It is testing further. Continental 1 Hooten, southeast outpost to the Risch Bend pool of southeastern Jack County, perforated casing at 4,410-30 ft. It tested 1,865,000 cu. ft. of gas with no oil. Operator is continuing to test. Continental 1 Roy Cherryhomes, wildcat 6½ miles southeast of Jacksboro, Jack County, logged hard broken lime from 5,564-90 ft. It is drilling below 5,612 ft. in shale.

Cooke County.—The Texas Co. 2 Gainesville National Bank, T. W. Ward Survey, has been completed for 160 bbl. of 44.8° gravity oil in 4 hours through ¾-in. tubing choke. It is producing from the Strawn sand at 4,746-80 ft. Texas 1 Buckley, wildcat 15 miles northeast of Gainesville, was drilling below 7,157 ft. in lime and shale. Sun Oil Co. 1 Mabel Field, 1-mile south outpost to the Sivall's Bend pool, was drilling ahead at 5,009 ft. in shale.

Fain & McGaha 1 Henning, wildcat 6 miles southwest of Wichita Falls, Wichita County, cored from 4,181-91 ft. and recovered 1 ft. of hard lime with odor of oil. On a 20-minute drill-stem test from 4,174-91 ft., 30 ft. of mud was recovered. It is being drilled deeper. Mid-Continent Petroleum Corp. 1 T. L. Burnett, wildcat 6 miles north of the Johnson pool in Foard County, logged dry sand from 6,076-6,101 ft. and is drilling ahead.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Craig & Neal Drilling 1 J. M. Black, Allison Armes Sur., 6 mi. S and 9 mi. W Archer City, dry, TD 1,305 ft.

Staley Oil Co. 1 Burt Lowry, Blk. 50, J. D. Harris subd. Club Ranch, 7½ mi. W Archer City, dry, TD 1,465 ft.

Clay County: F. H. Gohlke 16-A Householder est., Blk. 13, Byers Bros. subd. of MEP&P Sur. A-351, ¼ mi. SW Petrolia, elev. 977 ft., dry, TD 1,131 ft.

Fain & McGaha 1 J. West, Lot 78, Blk. 14, Montague CSL, 6 mi. SE Petrolia, elev. 969 ft., Ellenburger 5,052 ft., dry, TD 5,175 ft.

Cooke County: Kerlyn Oil 1 Norman, Joseph Bush Sur. A-107, 2 mi. SW Woodbine, elev. 747 ft., Ellenburger 4,538 ft., dry, TD 4,541 ft.

Grayson County: Pure Oil Co. 1 Little, J. Myers Sur. A-1443, 2 mi. SW Gordonville, elev. 662 ft., dry, 9,919 ft.

Jack County: L. W. Land 1 Sayde M. Garrison, Sec. 31, WCRR Sur. A-906, 1 mi. S Hess, elev. 1,195 ft., dry, TD 3,135 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCATS

Coleman County: New gas pool—Central Texas Gas 1 F. E. Strange, J. E. Melton Sur., 6 mi. SE Santa Anna, elev. 1,608 ft., top pay 2,063 ft., IP 8,000,000 cu. ft. gas day, perf. 2,063-92 ft. Marble Falls, shut-in pressure 920 lb., TD 2,160 ft.

Shackelford County: New oil pool—A. M. Hagan 1 J. H. Nail est., Sec. 126, ETRR Sur., 18 mi. N Albany, pumped 64 bbl. day through 2-in. perf. 1,315-20 ft. Cook sand, gravity 34°, TD 1,380 ft.

Stephens County: New oil pool—American Manufacturing 1 R. M. Rogers, Sec. 27, Blk. 5, T&P Sur., 2 mi. NW Caddo, elev. 1,385 ft., flowed 92 bbl. day through 16/64-in. choke on 2-in. tubing, perf. 4,470-4,513 ft., Ellenburger 4,458 ft., gravity 46°, TD 4,513 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Coleman County: Maguire Industries and Sohio 1-D J. P. Morris, BS&F Sur. No. 3, 2 mi. NW Novice, elev. 1,958 ft., dry, TD 3,812 ft.

Jones County: R. H. Roark and L. F. Hooker 1 W. H. Wyatt est., Sec. 1, Blk. 15, T&P Sur., 1½ mi. NE Nugent, elev. 1,548 ft., dry in Cook, TD, 1,780 ft.

Palo Pinto County: McCamey & Ice 1 Kittie Rider Corn, TE&L Sur., 2½ mi. NW Oran, dry, TD 2,510 ft.

Taylor County: Republic Natural Gas 1 J. T. Henslee, J. A. Nabors subd. No. 4, 4 mi. E Merkel, elev. 1,778 ft., dry, TD 2,752 ft.

EASTERN TEXAS

New 7,500-Ft. Test Staked in Navarro Co.

DALLAS.—A new 7,500-ft. wildcat will be drilled in Navarro County by J. L. Collins & Co. about 13 miles southeast of Corsicana. It will be 1 R. R. Greenlee, in the Robert Carodine Survey. Humble Oil & Refining Co. 1 Pickering Lumber, wildcat in the S. Francois Survey in Shelby County, took a 1-hour and 56-minute drill-stem test from 8,307-8,694 ft. and recovered

PENBERTHY
SUMP PUMPS

Used wherever seepage water accumulates, the Penberthy Automatic Electric Sump Pump and the Penberthy Automatic Drainer (water or steam operated) have demonstrated their superiority in this service. Simple and rugged design—copper and bronze construction throughout.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

3,000 ft. of gas-cut mud, 1,450 ft. of gas-cut salt water and 820 ft. of gas-cut mud. It was drilling below 8,802 ft. in hard sandy shale.

Hunt Oil Co. 1 V. Popper, wildcat 2½ miles southeast of Cash in Hunt County, is dry at 9,390 ft. in Smackover. Another failure is the Ryan Consolidated Petroleum Corp. 1 Mrs. W. B. Brown, wildcat in the Matilda Reynolds Survey, 7 miles south of Kaufman, Kaufman County. Total depth was 3,068 ft. Shell Oil Co. and Lone Star Production Co. 1 Tandy, wildcat 12 miles north and slightly east of Centerville, Leon County, made three attempts at drill stem tests from 9,652-57 ft., but all were failures. Core at 9,652-57 ft. recovered 2 ft. of dense oolitic lime with no shows. Core at 9,680-90 ft. recovered 4 ft. of shaley lime with no shows.

The Texas Co. 1 Dr. W. N. Sneed, southwest extension to 1 McKnight, recent gas discovery in Freestone County, was drilling below 7,942 ft. in hard sand. Geier-Jackson 2 Ford Newman, northwest outpost to Grapeland field, Houston County, is testing after perforating with 48 shots at 5,997-6,010 ft.

EASTERN TEXAS WILDCAT FAILURE

Cass County: Grubb & Hawkins et al 1 Sally George, Reuben Ard Sur., 4 mi. NE Kildare pool, elev. 224 ft., Glenrose 4,138 ft., Pettit 6,705 ft., Travis Peak 6,780 ft., dry, TD 7,445 ft.

TEXAS GULF COAST

Shell Discovery Flows 62 Bbl. Condensate

HOUSTON.—Shell Oil Co., Inc., 1 Kyle estate, discovery, in J. Grant Survey, Abstract 233, in the Inglehart are a 4 miles north of Garwood, Colorado County, was completed for 62 bbl. of 52° gravity condensate, through 50 perforations at 8,780-90 ft., with 3,500,000 cu. ft. of gas daily through ¼-in. choke. Tubing pressure was 2,000 lb. and casing pressure 2,150 lb. Total depth is 11,940 ft., with 5½-in. casing set to 8,850 ft.

Sun Oil Co. 1 Elizabeth M. Moore estate, Double Gum Bayou area discovery, in F. W. Plummer Survey, 6½ miles northwest of Winnie in Chambers County, was completed flowing a potential of 41 bbl. oil daily plus 50 per cent water, through 10/64-in. choke, gas-oil ratio 800 to 1, with tubing pressure 225 lb., gravity 37.6°. Total depth is 9,750 ft., with 7-in. casing set at 8,890 ft., perforated with 20 holes at 8,280-85 ft.

Sam G. Harrison 1 G. P. Willis et al, oil discovery well at South Hillje in Wharton County, flowed a potential of 103 bbl. of 28.5° gravity oil, no water, through 6/64-in. choke, tubing pressure 690 lb., gas-oil ratio 600 to 1. Total depth is 6,534 ft., with perforations at 5,230-44 ft.

Sam G. Harrison 1 T. N. Mauritz et al, gas discovery well at South Hillje in Wharton County, was completed making 1,000,000 cu. ft. of gas per day through 3/16-in. choke with 2 bbl. of 41.8° gravity oil daily. This test was drilled to 7,519 ft., but was plugged back for completion in perforations at 5,226-32 ft.

Sinclair Prairie Oil Co. 1 Tulane Gordon, extension well at the Frelsburg field, Colorado County, was dual-completed. In perforations at 8,847-8,917 ft., Zone 14, it flowed 119.3 bbl. condensate daily on 3/16-in. choke, 7,100,000 cu. ft. gas, tubing pressure 2,795 lb., and from perforations at 8,462-82 ft., Zone 12, it flowed 41.4 bbl. condensate daily through 3/16-in. choke, 2,550,000 cu. ft. gas, casing pressure 1,725 lb.

Stanolind Oil & Gas Co. et al 1 H. M. McMahan, east extension test at Lake Creek field, Montgomery County, is reported completed with an open flow of 11,000,000 cu. ft. gas daily. Last perforations were at 11,500-540 ft. Total depth is 11,824 ft. with 5½-in. liner set at 11,824 ft.

UPPER GULF COAST SUCCESSFUL WILDCATS

Chambers County: Oil discovery, Double Gum area—Sun 1 Elizabeth H. Moore estate, F. W. Plummer Sur., 6½ mi. NW Winnie, TD 9,750 ft., perf. 8,280-85 ft., PT 41 bbl. day plus 50 per cent water, 10/64-in. choke, gas-oil ratio 800, tubing pressure 225 lb., gravity 37.6°.

Jackson County: Moody Ranch oil discovery—Crown Central Petroleum 1 W. L. Moody, Jr., Nancy McFarland Sur., 5 mi. SW of Francitas, top of pay 8,822 ft., TD 9,284 ft., perf. 8,832-40 ft., PT 77.68 bbl. daily through 6/64-in. choke, gas-oil ratio 2,610, tubing pressure 1,800 lb., casing pressure 2,000 lb., gravity 46.3°, no water.

Wharton County: South Hillje gas discovery—Sam G. Harrison 1 T. N. Mauritz et al, M&C Sur., Sec. 11, 12 mi. SE of Hillje, TD 7,519 ft., perf. 5,226-32 ft., PT 1,000,000 cu. ft. gas through 3/16-in. choke with 2 bbl. of 41.8° gravity oil daily, gas-oil ratio 500,000, tubing pressure 880 lb., casing pressure 2,150 lb.

South Hillje oil discovery.—Sam G. Harrison 1 G. P. Willis et al, in Sec. 14, L. L. Miller Sur., 11 mi. SE of Hillje. TD 6,534 ft., perf. 5,230-44 ft., PT 103 bbl. day through 7/64-in. choke, gas-oil ratio 600, tubing pressure 690 lb., gravity 28.5.

UPPER GULF COAST WILDCAT FAILURES

Jackson County: Louis Crouch 1 S. G. Drushell, Mayo area, Morris & Cummings Sur., Sec. 13, dry at 6,017 ft.

R. H. Ranger 1 H. Landa, in J. Pierce Sur., 3 mi. NE of Cordele, dry at 4,510 ft.

OIL FIELD CONSTRUCTION AND LEASE SERVICE

For more than 25 years, we have been on the job, seeing each assignment through to completion. Whatever the job, large or small, from erection of derricks to general lease maintenance labor, we've been delivering with economy and efficiency. If you want the best, jot it down, it's a good name to remember.

MAHAN, McCARTY & BESSE, INC.

HUNT BUILDING TULSA, OKLAHOMA

MICHIGAN

Eight Oilers in Week's Nineteen Completions

SAGINAW.—Initial daily potential in Michigan oil fields jumped 10,250 bbl. last week through completion of another Deep River-Arenac gusher, four other heavy producers and three small wells. But wildcatting continued unproductive. Of the week's 19 completions, 11 were dry holes and eight of the failures were wildcat tests.

More drilling was slated for a dozen counties as the state conservation department issued 14 new permits, two each for locations in Otsego and Mecosta counties, the others for Allegan, Muskegon, Oceana, Osceola, Montcalm, Clare, Van Buren, Ottawa, Kent and Ionia counties.

MICHIGAN WILDCAT FAILURES

Allegan County, Hopkins Township: Charles W. Cook 1 Simpson, SE NW NE 29-3n-12w, dry in Traverse limestone, TD 1,645 ft.

Arenac County, Au Gres Township: Stork Oil 1 Petty, SE SW NW 25-19n-6e, dry, TD 700 ft.

Kalamazoo County, Prairie Ronde Township: Oil Producers 1 Stiver, SE SE SE 26-4s-12w, dry in Traverse limestone, TD 1,130 ft.

Kent County, Nelson Township: Michigan Consolidated Gas 1 Phillips et al, NW NW SE 3-10n-10w, dry hole, TD 1,036 ft.

Ottawa County, Holland Township: J. W. Lang Co. 1 City of Holland, NE NE NE 33-5n-15w, dry in Traverse limestone, TD 1,582 ft.

Newaygo County, Barton Township: Jetter & De Krafft 1 Sharp-Bridges, N½ NE NW 29-16n-11w, dry in Monroe, TD 3,695 ft.

Lake County, Chase Township: Rex Oil & Gas 1 Alta Samuels, NE SW NE 24-17n-11w, dry in Monroe, TD 3,790 ft.

St. Clair County, Kimball Township: R. B. Tamblyn Development 1 Newall, NW NW SW 3-6n-16e, dry in Dundee, TD 850 ft.

SOUTH LOUISIANA

New Record Set for Production Depth

NEW ORLEANS.—A new world's record for deep production was established by Shell Oil Co., Inc., at its 1 Smith-State, 13-14s-6e, on the north flank of the Weeks Island dome in Iberia Parish. This well flowed 300 bbl. of 40° gravity condensate per day with gas-oil ratio of 20,000 to 1, through perforations at 13,505-520 ft. Total depth is 14,025 ft., with 7-in. casing set at 13,550 ft. Previous record for production was held by Union Producing Co.-Fohs Oil Co. 2 Buckley-Bourge, in the DeLarge pool of Terrebonne Parish which was completed last year for a production of 500 bbl. of 36.4° gravity oil along with 2,000,000 cu. ft. of gas daily through ¼-in. choke from perforations at 13,498-13,503 ft.

Cities Service Oil Co. completed its second gas-condensate well in the Thornwell area of Cameron Parish. The new producer is 2 Lacassine, 6-12s-1w, south of the discovery well. Perforated at 9,631-41 ft., the well flowed 31.4 bbl. of condensate and 1,797,000 cu. ft. of gas per day through 10/64-in. choke, tubing pressure 4,365 lb. On gage through 20/64-in. choke, it flowed 132.6 bbl. of condensate and 7,080,000 cu. ft. gas per day with tubing pressure 3,025 lb. Cities Service has located 2 D. J. Benoit in the Thornwell area of Jefferson Davis and Cameron parishes, Section 36-11s-5w, and is contracted to 10,000 ft.

Barnsdall Oil Co. 6 Miller, 38-7s-3w, West Tepetate field, Jefferson Davis Parish, flowed 813 bbl. of oil per day on drill-stem test through perforations at 8,508-18 ft., using ¼-in. choke, tubing pressure 1,340 lb. Total depth is 9,326 ft., with 7-in. casing set on bottom.

CALIFORNIA

Paloma Deep Test New Sand Not Flowing Yet

LOS ANGELES.—Superior Oil Co.'s deep test in the Paloma field of Kern County which has been watched with considerable interest during the past several weeks does not look any too encouraging following several days of swabbing as it has failed to kick over. The operator will continue swabbing for a few more days as wells in this field some times take several days before getting under way. Core recoveries, however, show Superior's new oil sand to be very tight with very low permeabilities and for this reason the outlook is rather discouraging for substantial production in the new oil sand located immediately below the normal Paloma sand of Miocene age. If the new sand fails to show production within the next day or two, the deep test, 74-34 Houchin, in 34-31s-26e, will be plugged back and the 7⅝-in. casing per-

(Continued on Page 198)

STANDARD OF THE OIL FIELDS

Gotkool

WATER CANS & COOLERS

GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. (Push Button Faucet at slight additional cost.)

GOTT Water Cans are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting large removable top, strongly built to withstand rough usage. Gott Water Coolers have extra large covers and a handy non-leaking push button faucet. Your Supply Store has them, get one today.

GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

KEEP PURE DRINKING WATER ALWAYS HANDY

INSIST ON THE GENUINE
Look for the Blue and Black Label with the name GOTKOOL in Red

FESCO JEL BENTONITE
— for MUD —

Yes, Schundler's FESCO-JEL is widely recognized by Producers and Drillers as Wyoming bentonite of high degree of purity. It is mined from extensive reserve acreages of bentonite lands by F. E. Schundler Bentonite Co., Inc., carefully graded under laboratory control, then stock-piled to provide ample supplies of crudes suitable for a variety of industrial uses. Large tonnages are also satisfactorily used by many steel foundry clients. Producer is one of the pioneers, a tonnage exporter having modern drying, milling and packing facilities. Shipping capacity, 75,000 tons annually.

F. E. SCHUNDLER & CO., INC.
530 Railroad Street, Joliet, Illinois

SCHUNDLER

APPALACHIAN FIELD

Test Staked for Webster Springs Anticline

PITTSBURGH.—In West Virginia, Ohio Oil Co. has made a location for a wildcat on Webster Springs anticline in Williamsburg district, Greenbriar County. It is located 0.27 mile west 80 degrees 30 minutes; 5.55 miles south 38 degrees 15 minutes and starts at an elevation of 3,164.8 ft. or about 450 ft. above the Sewell Coal, lower Mississippian. It will be an interesting test of a large structure.

In Jackson County, Columbian Carbon Co. is drilling through the Oriskany in the test on V. M. Rhodes farm in Ripley district with a gage of 215,000 cu. ft. gas 25 ft. in the sand, topped at 5,050 ft.

In southwest Pennsylvania, the new oil discovery, Chas. E. Young 1 George B. Ecroyd in North Strabane Township, Washington County, which has been standing with about 2,200 ft. of oil in the hole from the Gordon sand was tubed to pump it down for casing. The well immediately made several flows. Previously several hundred barrels had been bailed from the hole.

ILLINOIS

Big Wells and Extensions to Pools Feature Week

CENTRALIA.—With the Illinois field relieved of most of its flood and mud condition, operations are returning to normal, and in the week in review 43 wells were completed and 50 new operations reported.

Perry Fulk 1 Powless, SE SE SE 5-1s-6e, a "near" wildcat, extended the North Sims pool. It produced 460 bbl. initially from acidized McClosky lime at 3,243-50 ft., total depth 3,289 ft.

In the recently opened Brownsville pool in White County Skelly Oil Co. 1 L. Kisner, NE SW SE 31-5s-9e, flowed 215 bbl. naturally from Lower O'Hare lime at 3,085-95 ft. and Rosiclare lime at 3,115-25 ft.

In the Woodlawn pool, Jefferson County, The Texas Co.'s Devonian lime test, 1 E. Eubank, SW NW SE 35-2s-1e (an old well deepened), found a 65-bbl. initial production in the Devonian at 3,726-40 ft., total depth 3,746 ft., with top of the Devonian at 3,660 ft.

The Rural Hill pool in White County was extended by T. Blake Dirickson et al 1 W. C. Presley, SE SE SW 5-6s-6e, which produced 180 bbl. per day from Aux Vases sand at 3,092-3,115 ft.

SUCCESSFUL WILDCAT COMPLETION IN ILLINOIS

Clay County: Paul Doran 1 Brissenden, SE SE SW 16-3n-7e. Tar Springs sand at 2,315-19 ft. produced 31 bbl. of oil and 18 bbl. of water. Extends the Sailor Springs pool.

ILLINOIS WILDCAT FAILURES

Clinton County: Carlson & Franseen 1 Swagler, SW SW NW 10-2n-1w, dry at 1,470 ft. Glen Dean 1,113 ft., Barlow 1,445 ft., drill-stem test at 1,444-54 ft. developed 40 ft. of oil and 105 ft. of salty mud.

Effingham County: Joe Dunbar et al 1 Goeckner, NE NW SE 19-7n-7e, dry at 2,794 ft. Base of Pennsylvanian 2,015 ft. Glen Dean 2,238 ft., Cypress 2,500 ft., Benoist 2,544 ft., Aux Vases 2,601 ft., McClosky 2,730 ft.

Lawrence County: Olds and Aetna 1 W. J. Warner, SE SE SW 1-3n-11w, dry at 1,853 ft., Glen Dean 1,365 ft., Cypress

Look Ahead With First National

Experience COUNTS!

—for "business-like"

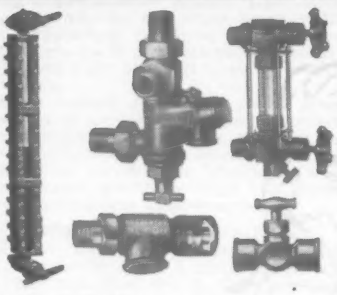
OIL LOANS

Golden 1895 1945 Anniversary

THE FIRST NATIONAL BANK AND TRUST COMPANY OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

PENBERTHY
QUALITY
PRODUCTS



Penberthy liquid level gages of various types—injectors—ejectors—all so widely used throughout the oil industry because they have always been dependable under the most severe service conditions.

All are of rugged construction and made by an organization with 57 years experience in the manufacture of quality products.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Making Heavy Lifting Jobs Safe

EVERY Simplex Hydraulic Jack has a safety factor of 50%, per pre-shipment test on a hydraulic press. Ruggedly constructed throughout, with no delicate parts. For "one hand" operation specify Simplex Industrial Hydraulic Jacks.

No. 50HJ, capacity 50-tons. Two pumps, high and low speed, can be operated singly or in unison. No. 30HJ, same design, capacity 30-tons. Single pump types; 3, 5, 8, 12 and 20-tons.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks
Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

1,550 ft., Benoist 1,600 ft., Aux Vases 1,687 ft., McClosky 1,798 ft.

Wayne County: C. Brehm 1 H. Young, NW SW NW 8-2s-8e, dry at 2,387 ft., Menard 1,496 ft., Cypress 1,958 ft., Benoist 2,079 ft., Aux Vases 2,162 ft., Fredonia 2,308 ft.

W. O. Schock et al 1 Bowyer, NE SE NE 33-1s-5e, dry at 3,188 ft. Lower Glen Dean 2,500 ft., Barlow 2,694 ft., Ste. Genevieve 3,048 ft., Lower O'Hara (Levias) 3,057 ft., Fredonia 3,109 ft.

Washington County: The Texas Co. 1 Doelling, NW SE SW 30-1s-3w, dry at 1,416 ft., Vienna 777 ft., Cypress 1,029 ft., Weiler 1,088 ft., Benoist 1,177 ft., Aux Vases 1,285 ft., McClosky 1,403 ft

KANSAS

Sumner County Well Has Good Drill-Stem Test

CARTER Oil Co. 1 Latimer, NW NE 12-33-2w, a Sumner County wildcat about 7 miles south of the Wellington pool, has recovered oil and gas on a drill-stem test taken at 4,270-82 ft., in the Simpson sand. A five-foot core was taken at 4,272-4,277 ft., recovering 2 ft. and 4 inches. The top 4 inches was soft sand, with good porosity and fair odor and stain. A drill-stem test was taken at 4,270-82 ft., open 50 minutes, which showed gas in 11 minutes. A recovery of 330 ft. of green oil, 345 ft. of oil-cut mud, and 15 ft. of salt water was made. Gravity of the oil is 47°.

The Salina pool of Saline County has been given a north extension by Westgate-Greenland 1 Prescott, NW SE SW 17-14-2w. Pump potential given the well is 245 bbl. per day.

Derby Oil Co. 1 Rogg, SE SE SW 7-13-14w, approximately 1½ miles north of the Atherton pool, has apparently opened a new pool for Russell County. Saturation was found at 3,197-3,200 ft. in the Arbuckle, and the hole started filling with oil after the plug was drilled. After acidizing, a three-hour swab test was made, resulting in 47½ bbl. the first hour, 37½ bbl. the second hour, and 30 bbl. the last hour.

KANSAS SUCCESSFUL WILDCATS

Meade County: New gas pool—Stanolind 1 Adams, SW SW SW 8-35-30w, 88,000,000 cu. ft. gas from Mississippia lime at 5,850-90 ft. TD 7,921 ft., Mississippi 5,861 ft., Maquoketa 7,420 ft., Viola 7,500 ft., Simpson 7,638 ft., Arbuckle 7,704 ft.

Norton County: New oil pool—Helmerich & Payne 1 Hansen, SW NW 26-5-21w, physical potential 102 bbl. from Arbuckle at 3,650-56 ft., TD 3,720 ft., Kansas City 3,422 ft., Arbuckle 3,650 ft.

Russell County: New pay in old oil pool—Forest Hill pool, Harry Gore 1 Luerman, N/2 SW NE 28-15-12w, physical potential 697 bbl. from Topeka at 2,825-33 ft., TD 2,833 ft., anhydrite 708 ft., Topeka 2,635 ft.

Stanton County: Extension to gas pool—Stanolind 1 Fegan, C 3-27-39w, state potential 9,789,510 cu. ft gas from Permian at 2,383-2,529 ft., TD 2,605 ft., Fort Riley 2,550 ft.

KANSAS WILDCAT FAILURES

Barton County: Black-Marshall 1 Grosshardt, SW SW NE 34-17-11w, dry, TD 3,325 ft., Cleveland 3,320 ft.

Butler County: J. E. Morris et al 1 Halem, N/2 NE SE 22-26-5e, dry, TD 2,750 ft., Bartlesville 2,679 ft.

Rooks County: Harbar 1 Brobst, NW NW NW 7-6-19w, dry, TD 3,645 ft., granite 3,631 ft.

Stafford County: Stanolind 1 Hughes, NE NW SE 13-23-12w, dry, TD 3,790 ft., Arbuckle 3,746 ft.

Max Cohen 1 Langer, NW NW NE 4-21-14w, dry, TD 3,632 ft., Arbuckle 3,597 ft.

Western
GEOPHYSICAL
COMPANY

COMBINING in one organization the largest and most complete geophysical research facilities in the world together with unexcelled equipment, experienced field crews and proven interpretation technique, Western Geophysical Company meets every requirement of operators desiring a complete and well-rounded geophysical service.

Western's seismic and gravity crews are now operating in all parts of the United States and in South America. Western service is available for surveys in any part of the world. Inquiries are invited.

Western GEOPHYSICAL COMPANY
HENRY SALVATORI, PRESIDENT
EDISON BLDG. LOS ANGELES 13, CALIF.
FIRST NATIONAL BANK BLDG., DALLAS 2, TEXAS
118 COMMERCE ST. NATCHEZ, MISSISSIPPI

HARRISON
EQUIPMENT COMPANY
Electronic
Oil Exploration
Supplies
1422 SAN JACINTO PRESTON 4149
HOUSTON 2, TEXAS

GEOPHYSICAL
TRANSFORMERS

Sealed against sub-tropical humidity . . . "Sextuplex Shielding", improved uniformity, minimum size and weight, plug-in terminal block. Also available with terminal lugs.

GEOPHONE CABLE
GOTT WATER CANS
BURGESS BATTERIES
CORNELL-DUBILIER CONDENSERS

Full Line of
GEOPHYSICAL ELECTRONIC
SUPPLIES

MISSISSIPPI

Plan Dual Completion For Baxterville Well

JACKSON.—Sun Oil Co. 1 Snowden, NW NW NE 7-1n-16w, in the Baxterville field of Lamar County, is running tubing with packer and side-door choke for a dual completion. The Massive sand, topped at 8,656 ft., yielded several successful drill-stem tests. Perforations were made and packer was set to test perforations at 8,670-80 ft., 8,689-98 ft., and 8,726-36 ft. The well flowed 171 bbl. of 14.5° gravity oil in 8 hours.

In the Sunniland area of Collier County, Florida, Humble Oil & Refining Co. 4 Gulf Coast Realty Co., 8,000 ft. north of the 1 Gulf Coast, discovery well, has a potential of 12½ bbl. per hour on flow, 18 per cent salt water, through ¼-in. choke. Good porosity was found at 11,588-97 ft., and a drill-stem test recovered 5,990 ft. of 19.2 gravity oil. The 7-in. casing was set at 11,564 ft., and the well washed in and cleaned into pits, before the potential was run.

MISSISSIPPI WILDCAT FAILURES

Hinds County: Carter 1 Davis, NE NE 15-3n-4w, dry, TD 10,000 ft., Comanche 9,448 ft.

Jones County: Gulf 1 Flynt, SW NE 35-9n-12w, dry, TD 9,023 ft., Comanche 8,993 ft.

Gulf 1 Valentine, 668 ft. south and 660 ft. east of NW cor. NE NW 4-9n-13w, dry, TD 8,305 ft., Comanche 8,283 ft.

Madison County: Carter 1 Jones, NW NE . 23-11n-3e, dry, TD 5,091 ft.

FLORIDA WILDCAT FAILURE

Charlotte County: Humble 1 Lownes-Treadwell, SW NE 17-42s-23e, junked at total depth 2,130 ft.

ROCKY MOUNTAIN

Test Scheduled for Axial Dome, Moffat Co.

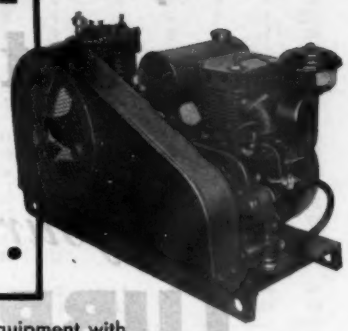
DENVER.—An important wildcat scheduled to be drilled in Colorado this summer will be a test of the Axial dome on the Danforth Hills anticline in Moffat County by the Kerlyn Oil Co., as a joint operation with the Frontier Refining Co. The structure lies 7 miles to the northwest of the Wilson Creek field across the line in Rio Blanco County, and 18 miles west of the Iles field. The test will go to the Sundance at around 7,000 ft. That is approximately the same depth that horizon is encountered at Wilson Creek. The location is 1 Unit, NW NW 35-4n-95w, at the head of Maudlin Gulch.

No test on Ida Goodstein well.—Continental Oil Co. is installing power line and pumping unit at its 1 Ida Goodstein, NE SE SW 20-57n-99w, a discovery in the Tensleep at South Elk Basin, and it will be several weeks before a test will be made. Total depth is 7,166 ft. with 1,594 ft. of 5½-in. liner at the bottom. After running the liner the well flowed approximately 50 bbl. an hour through the casing, but would not flow through the tubing, indicating leaks of gas outside the pipe from upper horizons. A string of 5½-in. has been run to the top of the liner at 5,565 ft. and will be perforated. While it has shown heavy saturation in the Tensleep, there appears to be comparatively little gas with the oil in that horizon.

WYOMING WILDCAT FAILURE

Niobrara County, Cow Gulch: John Bergren 1 Dunlap, SE NW NW 9-36n-62w,

WISCONSIN
HEAVY-DUTY *Air-Cooled*
ENGINES in OIL FIELD SERVICE...



Here is another typical piece of oil field equipment with a wide range of service applications . . . a Model ADA two-stage Gardner-Denver Compressor, powered by a Model AEH (4 to 6 hp.) single cylinder air-cooled engine. This unit was built for the Gulf Oil Corporation and supplied by Harley Sales Company.

Where there's a power job to be done, or a piece of equipment to be operated . . . time-, labor- and maintenance costs to be saved . . . Wisconsin Heavy-Duty Air-Cooled Engines can be depended upon to come *through* and keep on coming back for more.

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
510 Atlas Building, Tulsa, Oklahoma
M & M Building, Houston, Texas
Oil field distributors for Wisconsin Engines and all types of utility units.

This advertisement appears as a matter of record only and is under no circumstances to be construed as an offering of these securities for sale, or as a solicitation of an offer to buy any of such securities. The offering is made only by the Prospectus.

300,000 Shares

Tide Water Associated Oil Company

$3.75 Cumulative Preferred Stock

Without Par Value

Price $105 per Share

(Plus accrued dividends from April 1, 1945)

Of the above mentioned shares, 172,398 shares are issuable in exchange to holders of the Company's outstanding 500,000 shares of $4.50 Cumulative Convertible Preferred Stock pursuant to the Company's exchange offer, and the remaining 127,602 shares are being purchased by the several Underwriters and are being offered at the public offering price set forth above.

Copies of the Prospectus may be obtained in any State from such of the several Underwriters, including the undersigned, as may lawfully offer the securities in such State.

KUHN, LOEB & CO. LEHMAN BROTHERS

May 10, 1945.

why worry about Octane?

•

sell your customers

LUBRI-GAS

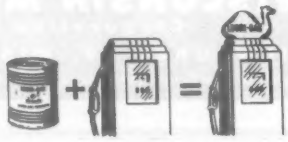
PROCESSED GASOLINE

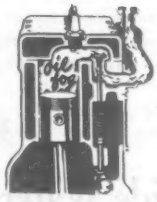
THE PREMIUM PLUS GASOLINE

Any 68 to 72 octane gas treated with Lubri-Gas gives premium motor performance.

WHAT LUBRI-GAS IS

Lubri-Gas is essentially a 40SAE Lubricating Oil processed with a detergent and other gum and carbon inhibiting chemicals so that the treated oil mixes freely with the motor fuel, and lubricates the motor parts which otherwise would be without this needed protection.



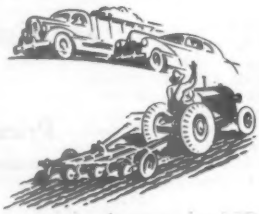


WHAT LUBRI-GAS DOES

Lubri-Gas enters the combustion chamber in the form of a fine oily mist or fog. This fog will not burn at motor temperature. It condenses back to clean oil and bathes the valves, spark-plugs, cylinder walls, pistons and piston rings with a protective film.

Carbon, gum and sludge are loosened and discharged through the exhaust.

Sticky valves are freed—Knocks disappear—motor runs cooler with more power and gives MORE MILES PER GALLON.



JOBBERS—DEALERS: You Can Sell Lubri-Gas! Write Today!

Registered Trademark

LUBRI-GAS LABORATORIES
221 No. LaSalle St.
Chicago 1, Illinois

LUBRI-GAS

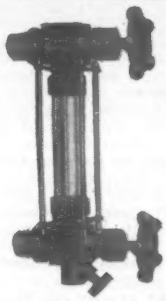
is Premium Plus
because it is not only Anti-Knock, but also Anti-Friction, Anti-Carbon, Anti-Gum, Anti-Sludge.

Cleans and Lubricates as It Powers Your Motor

PENBERTHY

"ALL IRON"

LIQUID LEVEL GAGES



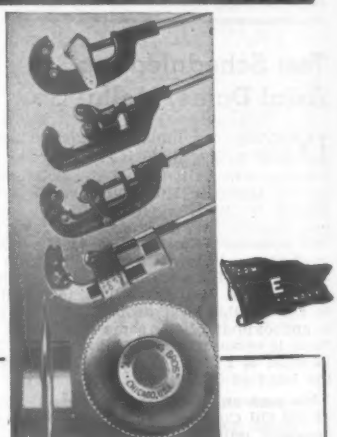
Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

The "All Iron" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

Look for the Arm-and-Hammer

ARMSTRONG BROS.



All ARMSTRONG BROS. Pipe Cutters are made in all standard types. Each is a quality tool with hardened steel pins and rollers. "Saunders Type"—hardened end of thrust rod bears on inserted hard steel block (double life). In "Drop Forged" and "Combination" types, which take either 1 or 3 wheels, a replaceable hardened steel nut takes up thrust. In the "Barnes" type thrust rod threads through drop forged steel section.

ARMSTRONG BROS. Knife Blade Cutter Wheels (smooth or knurled) have thin penetrating edges that hold their keenness because they are machines from special vanadium tool steel, hardened and oil tempered. Fit all standard-make pipe cutters.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
304 N. FRANCISCO AVE CHICAGO U.S.A.

TD 1,670 ft., dry in upper Minnelusa after testing Sundance.

MONTANA SUCCESSFUL WILDCAT

Pondera County, Brady district: Texas 1 McCann, SE NW SE 21-27n-2w, TD 1,502 ft., PB 1,496 ft., 7-in. 1,455 ft., top Sunburst sand 1,451 ft., yellow sand 1,468-96 ft., 7½ bbl. oil, 1½ bbl. water in 24 hours, shot with 60 qt. at 1,496-1,480½ ft., waiting on pump equipment.

MONTANA WILDCAT FAILURE

Park County, Springdale: R. C. Tarrant 1 Tarrant-Peterson, NW NW 5-2s-12e, TD 3,180 ft., sandy lime 3,170-80 ft., flowing water, dry.

LA.-ARK.

Bienville Parish Has New 40° Gravity Pool

SHREVEPORT. — Bienville Parish has been given a new pool by the Ohio Oil Co. 1 Woodward-Walker, NE SE 31-17n-7w. The well is producing from the Pettit sand at 6,830 ft., and is reported flowing 300 bbl. per day of 40° gravity oil.

Bossier Parish.—J. R. Hayden, trustee, 1 Ellerbe, 3-20n-13w, perforated the Cotton Valley "D" sand at 8,036-42 ft., and flowed 28 bbl. of distillate, 16 bbl. of salt water and 480,000 cu. ft. of gas in 24 hours.

Caldwell Parish.—Shell Oil Co. 1 Louisiana Central Oil & Gas Co., a wildcat in SW SW NW 31-15n-3e, tested 6,200,000 cu. ft. of gas and 1 bbl. of water from perforations at 9,610-34 ft. The well has been shut in.

ARKANSAS WILDCAT FAILURES

Cleveland County: E. E. Moore 1 Moore est., SW NE 28-9s-10w, dry, TD 4,115 ft.

Columbia County: H. A. Wright et al 1 Woodward, SE NE 6-17s-19w, dry, TD 7,502 ft.

NORTH LOUISIANA WILDCAT FAILURES

Richland Parish: G. C. Schoonmaker et al 1 Goldmine, 330 ft. north and 990 ft. east of SW cor. of 10-14n-6e, dry, TD 5,166 ft.

Sabine Parish: W. I. Nowlin 1 Brown Lumber Co., 1,650 ft. south and 1,650 ft. east of NW cor. of 11-7n-10w, dry, TD 3,503 ft.

SOUTH LOUISIANA WILDCAT FAILURE

Cameron Parish: Superior of California-Pure 12 State-Gulf of Mexico, Creole area, 4-15s-8w, dry at 8,518 ft.

CANADIAN FIELDS

Turner Valley Well Has 350-Bbl. Initial

CHATHAM. — In West Central Turner Valley, Pacific Petroleums, Ltd. 8, LSD 14, 35-19-3w5, has initial production of 350 bbl. daily from Madison limestone at 8,238-8,479 ft. Rig is moving for Pacific 9, LSD 11, 35-19-3w5.

In North Central Turner Valley, Royalite Oil Co., Ltd. 81, LSD 8, 2-20-3w5, finished at 7,348 ft. with Madison lime contact at 6,897 ft., and is making 40 bbl. an hour on initial tests.

Steveville. — In the Steveville-Princess field, eastern Alberta, Toronto Syndicate 1, LSD 1, 6-22-13w4, got Devonian limestone contact at 4,179 ft., and at 4,190 ft. stopped drilling to test 6 ft. of porosity. The indicated strike extends the Devonian production north and west of the Princess-C.P.R. 18-21-A discovery well in LSD 16, 21-20-12w4. In the same field, Peerless Syndicate 1, LSD 4, 18-20-11w4, 4 miles southeast of the discovery, at 3,184 ft. has indicated production of 150 bbl. of water-free 27° gravity crude, apparently from the Sunburst sand. Tests got the Sunburst at 3,169-79 ft. with 1,500,000 cu. ft. gas and a show of oil with shale break at 3,178-79 ft. in a second sand at 3,180-84 ft. oil rose 580 ft. in 1½ hours in a drill-stem test, with gas flow of 25,000 to 50,000 cu. ft. A second shale break indicates a possible lower sand.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended May 19, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	0	0	0	0	0	7	25	32
Indiana	0	0	0	0	0	2	0	0	7	9
Illinois	1	0	0	6	7	17	0	0	93	110
Kentucky	1	0	0	0	1	4	0	1	14	19
Michigan	0	0	0	8	8	3	0	1	96	100
Kansas	2	0	2	5	9	16	0	8	121	145
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	9	9
Oklahoma	5	0	0	9	14	40	0	6	113	159
Texas:										
North Central	2	0	1	11	14	37	0	4	181	222
West	0	0	0	5	5	24	0	0	115	139
Panhandle	0	0	0	0	0	0	0	1	4	5
Eastern	0	0	0	1	1	5	2	0	34	41
Gulf Coast	4	0	1	5	10	26	1	13	96	136
Southwest	0	0	0	1	1	9	1	3	64	77
Total Texas	6	0	2	23	31	101	4	21	494	620
Louisiana:										
Northern	0	0	0	2	2	1	1	2	26	30
Southern	0	0	0	1	1	12	0	0	18	30
Total Louisiana	0	0	0	3	3	13	1	2	44	60
Arkansas	0	0	0	2	2	0	0	0	21	21
Mississippi	0	0	0	4	4	3	0	0	46	49
Ala., Ga., Florida	0	0	0	1	1	0	0	1	10	11
Montana	1	0	0	1	2	6	0	0	9	15
Wyoming	0	0	0	1	1	8	0	0	15	23
Colorado-Utah	0	0	0	0	0	0	0	0	3	3
New Mexico	0	0	0	0	0	6	0	2	25	33
California	0	0	0	2	2	1	0	2	75	78
Total United States	16	0	4	65	85	220	5	51	1,220	1,496
Total previous week	9	0	4	59	72					

OHIO, KENTUCKY

Middle Wellington Pool Continues to Expand

COLUMBUS. — The Middle Wellington pool in Lorain County continues its expansion with the completion of the Ohio Fuel Co. 1 W. G. Nord, Lot 7, Penfield Township. Upper Clinton was logged at 2,364-2,379 ft., and gaged 2,260,000 cu. ft. Three additional locations have been staked in the east end of the pool.

The Wheeling Oriskany pool was extended a location to the west by Ohio Fuel 1 H. B. Wilson et al., Section 22, Wheeling Township, Guernsey County. Sand was found at 3,107-3,114 ft. with an open flow of 902,000 cu. ft.

EASTERN KENTUCKY

ASHLAND.—Only one completion was recorded in the eastern Kentucky field operations for the week. Inland Gas Corp. completed No. 269 on the J. W. Cornette land on Troublesome Creek in Knott County, at a total depth of 2,831 ft., with a daily open flow of 127,000 cu. ft. of gas from White Slate in shale.

WESTERN KENTUCKY

OWENSBORO.—Ashland Oil & Refining Co. 1 Verona Coal Co., 1¼ miles north of Waverly, Union County, a well not yet completed, flowed 105 bbl. in 2 hours and 15 minutes, naturally, from Cypress sand at 2,283-87 ft., but still in the sand. The showing is the largest made by a well in the same length of time in western Kentucky this year.

Another important near completion is J. W. Carter and Salee Bros. 1 J. W. Liles, a wildcat in SE¼ 21-O-22, Henderson County, pumped 376 bbl. in 22 hours from Cypress sand at 2,289-2,301 ft., total depth.

In Webster County Carter Oil Co. completed a wildcat, 1 F. G. Stull, 11-N-23, in Tar Springs sand at 1,818-35 ft. It swabbed 174 bbl. of oil and 52 bbl. of water in 24 hours. It may extend the South Poole pool.

SUCCESSFUL COMPLETION IN WESTERN KENTUCKY

Webster County: Carter Oil 1 F. G. Stull, 11-N-23, Tar Springs sand at 1,818-35 ft., TD, swabbed 174 bbl. oil and 55 bbl. water in 24 hours. New pool or an extension to the South Poole pool.

TENNESSEE WILDCAT FAILURE

Cumberland County: Kingwood Oil Co. 1 G. E. Harrison, NE cor. 12-H-53, 6 mi. SW of Crossville, dry at 3,707 ft., through Knox dolomite.

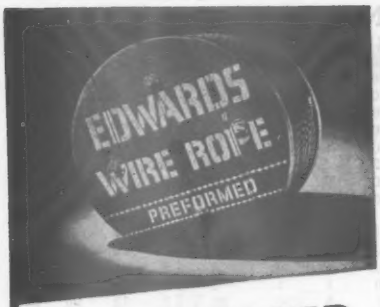
OKLAHOMA

Oil in Bartlesville in South Moore Field

THE first appreciable showing of oil in the Bartlesville sand in the South Moore field in Cleveland County, Oklahoma, was reported in the past week when Wood Oil Co. 1 Siler, SW SE NE 30-10n-3w, flowed oil on a drill-stem test of the Bartlesville at 7,870-90 ft., but drilling was continued to the deeper zones, Hunton and Wilcox. The well sprayed oil and gas for 35 minutes and had 3,600 ft. of oil in the tester. Mid-Continent Oil Corp. 1 Turk, SW SW NE 29-10n-3w, dry in the Wilcox sand at 7,840 ft., will next test the Bartlesville.

A survey of the West Edmond field shows that drilling has declined nearly 50 per cent since January 1 leaving only a total of 63 operations including rigging

(Continued on Page 198)



PREFORMED
... proven by
Performance

When the full story of America's amazing production record in this war is told, you'll find PREFORMED Wire Rope proud of its performance.

In the oil fields, its easier handling, freedom from kinking and porcupining, and smooth, rapid winding, have aided considerably in achieving all-important peak production.

After V-E Day, there'll be an even greater demand for PREFORMED dependability and the never-failing uniformity that has so long been identified with EDWARDS PREFORMED Wire Rope.

HOUSTON: 1208 Velasco-Fairfax 5434
LOS ANGELES: 650 E. 61st-Century 29205
SEATTLE: 1044 6th Avenue So.-Main 2218
PORTLAND: 2690 N. W. Nicolai-Beacon 7351
General Offices: 200 Bush St., San Francisco
FACTORY
So. San Francisco, Calif.

E. H.
EDWARDS
COMPANY

Among the Drilling Contractors

L. T. Barber will drill the Michigan Consolidated Gas Co. 1 George W. Cleary et al, in C S½ 28-11n-7w, Montcalm County, Michigan.

McIntyre Drilling Co., recently organized by Harold McIntyre, of Calgary, Alta., has a contract for a test near Nanton, Alta., on which a portable outfit will be used.

Gordon Oil Co. is contractor on two tests The Ohio Oil Co. will drill in Michigan. One of these is the 1 Lawrence H. Young, in NW NW SE 34-9n-14w, Muskegon County, and the other is the 2 Inez Cota, in C S½ NE NE 5-17n-10w, Osceola County. Contractor will also drill the Michigan Consolidated Gas Co. 1 Herbert E. Tetzlaff et al, in C NW 4-15n-9w, Mecosta County.

Dorris Blue, contractor on the Charles H. Osmond 1 Armstrong-Ellislie, in 31-5n-2w, Adams County, Mississippi, was rigging up.

Drilling & Exploration Co. recently spudded in a new well in the Ventura Avenue field, California, for Lloyd Corp., Ltd., and has been awarded contract for another well on the same property.

Lyle Cashion Drilling Co. is contractor on the Gulf Refining Co. 1 Davis Grayson, in SW NE SE 18-9n-13w, Jones County, Mississippi.

Drilling Contractors, Ltd., of Calgary, Alta., who have handled considerable contract work in southern Alberta, are changing their name to Anglo Drillers, Ltd.

A. R. Sarver is contractor on the E. C. Daily 1 Barber-Walker-Tissue & Frank, in NE SW SE 6-10n-5w, Montcalm County, Michigan.

Martin Harris Drilling Co. has the contract on the J. H. Gwin 1 Allison Lumber Co., in C NE SW 36-19n-4w, Sumter County, Alabama.

Perry-Busk & Ormiston will drill the Clifford A. Perry 1 James Driesenga, in NW NW NE 8-5n-14w, Ottawa County, Michigan.

Canokla Drillers, Ltd., of Edmonton, Alta., have contract for a deep test on the Bruderheim structure, northeast of that city for Kitalta Oils, Ltd., a new corporation backed by eastern Canada capital. Location is in LSD 5, 20-55-20w4.

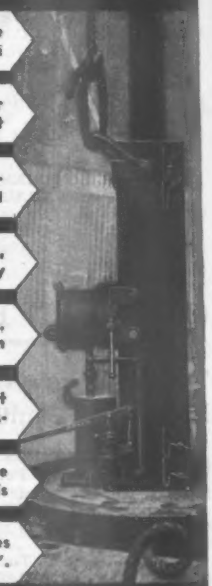
Harry Stroud is contractor on the Harris Oil Co. and Del Fortney 1 K. D. & C. M. Pease, in C NE 9-2s-13w, Van Buren County, Michigan.

Helmerich & Payne, Inc. are contractors on the Carter Oil Co. 1 Chapple, Section 21-31-32, Seward County, Kansas, near the Hugoton area.

William Efaw, Eldorado, Kans., is the drilling contractor on the Milt Isern 1 Ashcraft, in SW SW SE 14-26-5e, Butler County, Kansas. Location is approximately ¼ mile west of the old Eldorado municipal airport.

Have You Any Bent Kellys or Drill Pipe?

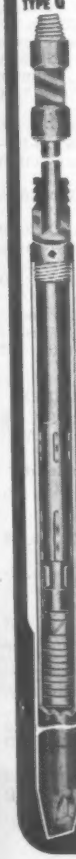
Here's a good, safe way to straighten Kelly, Drill Collar or Drill Pipe as it hangs in the derrick. Easily carried on a pick-up truck, and lifted on rotary table with catline. Ideal for foreign use or on wildcat wells where transporting Kelly or pipe from rig to shop is a problem. Handles pipe up to 8¾".



BAKER
Portable Hydraulic Kelly and Pipe Straightener

NOW I ASK YOU-

- Do you really believe I am the proper person to do this sort of work? I do not!
- In fact, I am just about as efficient at this as the average sand pump or clean-out bailer is at cleaning out an oil well.
- Confidentially, if you want a real clean-out tool go to your nearest supply store and order the tops among all clean-out tools . . .



"THE MIDCO BAILER"

- Every individual feature of the MIDCO contributes in some degree to the almost unbelievable results obtained.
- Large volume of sales in both Domestic and Foreign fields permits maintenance of price competitive with any clean-out tool.
- Distributors located in practically all fields make replacement parts readily available.
- G-TYPE has solid steel plunger rod—exceptionally sturdy construction throughout.

Standard cable tool pin permits Jars and Sinker to be run above pump, eliminating fishing jobs.

- F-5 TYPE has patented plunger construction to assure highest possible efficiency in this type of pump.

PATENT No. 2061486
2090055 — 2090280
2176231 — 2187042
Other Patents Pending
TYPE-G TYPE F-5

For additional information see COMPOSITE CATALOG, Page 1903
Call, wire or write

MIDCO BAILER CO.
1006 - 1012 S. E. 29th STREET
TELEPHONE 7-8586 BOX 1542
OKLAHOMA CITY • OKLAHOMA

MEN WHO KNOW
Recommend
JUSTRITE for Safety

When men in the field who use Justrite Safety Products say they're "copacetic" you can bet they're okay for the oil fields are tough proving grounds for any product.

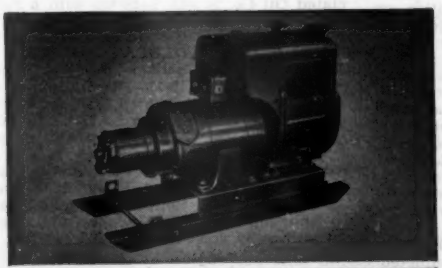
INSPECTOR'S SAFETY LANTERN

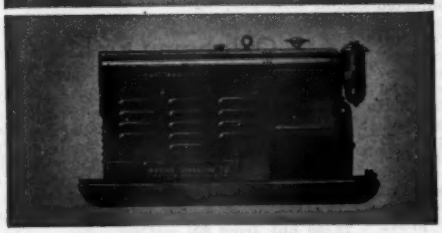
A Justrite electric lantern designed for general inspection work. It has "kick-out" bulb sockets and sparkproofed guard . . . and is approved for safety by the U. S. Bureau of Mines for safe use in methane gas and air mixtures. Twin-bulbs guard against the hazards of light failure. Large fixed handle for carrying over the arm provides two hand grips. Polished 7-inch reflector can be removed or replaced easily. A powerful light that's guaranteed for safety . . . Justrite.

Model No. 46-S

Ask at supply companies about Justrite Safety Products.

JUSTRITE MANUFACTURING COMPANY 2063 N. Southport Avenue Dept. G-1, Chicago 14, Ill.





MASTER GAS-ELECTRIC GENERATING PLANTS
COMPACT PORTABLE
SAVE TIME AND SPEED WORK WHEREVER POWER OR LIGHTING IS REQUIRED

Eleven basic sizes from 500 watts to 17,000 watts and 30 different types to meet all AC or DC power or lighting requirements. Housed or open models . . . available with wheelbarrow, buggy or trailer mounting. For operating a single tool or motor, or floodlight . . . or gangs of tools, groups of motors, or lighting entire areas. Easy to put in operation . . . economical to operate and maintain. Compact, portable, self-contained.

For complete details write for Bulletin 594.

THE NATIONAL SUPPLY COMPANY

Sole Distributor to the Oil Industry throughout the World

GENERAL SALES OFFICES—TOLEDO 1, OHIO

Branch Offices in or near all major oil fields in the United States, Canada, South America and other foreign countries

Manufactured by MASTER VIBRATOR COMPANY, *Dayton 1, Ohio*

Summary of April Completions *

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	138	69	100	0	†69	0	138	0	0	0	199,110	143
Pennsylvania	320	169	310	19	‡132	38	279	3	0	0	483,250	386
West Virginia	59	5	8	43	11	2	34	22	1	0	146,310	68
Ohio	68	13	396	24	31	7	18	42	1	0	193,126	107
Indiana	24	8	340	0	16	7	14	3	0	0	37,808	37
Kentucky	51	18	1,366	5	28	12	23	15	1	0	255,258	73
Illinois	116	66	9,838	0	50	1	30	85	0	0	324,589	173
Michigan	48	20	10,339	1	27	1	20	25	2	0	125,409	149
Kansas	121	57	22,450	12	§52	0	9	111	1	0	403,772	277
Neb., Mo., Iowa	1	0	0	0	1	1	0	0	0	0	965	6
Oklahoma	176	93	40,103	22	61	8	22	77	68	1	754,166	540
Texas	592	316	83,967	78	198	28	128	226	200	10	2,547,296	1,057
North Texas	130	75	7,512	1	54	21	74	20	15	0	303,739	130
West Central Texas	57	22	11,667	10	25	2	18	37	0	0	156,381	71
West Texas	145	99	48,919	3	43	3	23	65	53	1	650,377	320
Panhandle Texas	56	13	1,920	42	1	0	2	53	1	0	187,901	135
East Texas	27	6	1,172	7	14	1	1	3	20	2	187,056	106
Upper Gulf Coast	58	29	4,427	5	24	0	1	6	44	7	423,563	102
Lower Gulf Coast	65	44	6,137	7	14	1	0	11	53	0	413,204	108
South Texas	49	26	2,023	3	20	0	9	29	11	0	198,971	68
South Central Texas	5	2	190	0	3	0	0	2	3	0	26,104	17
Louisiana	84	45	9,153	7	32	5	6	14	37	22	604,048	187
North Louisiana	27	9	1,685	5	13	5	5	10	7	0	102,053	75
South Louisiana	57	36	7,468	2	19	0	1	4	30	22	501,995	112
Arkansas	12	9	855	0	3	0	2	6	4	0	59,844	33
Mississippi	33	15	2,673	0	18	0	1	7	23	2	201,805	88
Ala., Ga., Florida	4	2	161	1	1	0	1	3	0	0	11,409	21
Montana	29	21	1,536	3	5	1	19	7	2	0	67,120	75
Wyoming	19	13	5,031	0	6	1	1	10	7	0	83,038	96
Colorado-Utah	4	4	1,448	0	0	0	0	0	4	0	25,414	24
New Mexico	41	29	4,943	4	8	4	7	22	7	1	129,792	99
California	217	179	37,683	5	33	11	40	124	39	3	821,571	251
Total April	2,157	1,151	232,700	224	782	127	792	802	397	39	7,475,100	3,957
Total March	2,268	1,235	293,345	260	773	104	699	911	501	53	8,307,179	3,928

*Four weeks ending April 28, 1945. Service wells included: †69, ‡129, §1.

California Fields

(Continued from Page 188)

forated opposite the Paloma zone which showed good production possibilities on a formation test a few weeks ago.

The amount of zone to be taken in will be watched with interest, too, as this well revealed a greater thickness of oil sand in the Paloma zone than has heretofore been suspected. Completion of a large flowing well by Superior will add about 100 acres to the limits of the field along the north flank and prove up additional locations for future work. Superior's 74-34 Houchin with over 100 ft. of oil sand in the Paloma indicates the outer limits of the field are still further north of the surface location of this well and when development work has been completed the addition may greatly exceed the present nominal assignment of 100 acres. Additional exploratory work at a higher structural location might prove of considerable importance as this lower sand might have more favorable porosities and permeabilities on top of the anticline. Western Gulf Oil Co. is proceeding with a test of the new sand found in 67-6 L.A.A.C. in the extreme eastern end of the Paloma structure, with chances of production about even. Completion of a good well at this location would prove of considerable importance as the zone being tested is below the Symons and might be the Paloma zone which is highly productive within the confines of the field to the west. About 1 mile separates the two areas.

Standard Oil Co. has passed 9,800 ft. in 58-4 Cahn, a deep test in the Lost Hills field, and at this depth is believed to be above the Eocene which is the present objective.

There was no change for the better in any of the several deep tests under way in various fields throughout the state during the past week. At Dominguez, Shell Oil Co. is held up with a fishing job in 135 Reyes at 12,455 ft. and in the Long Beach field, Shell has reached a depth of 12,385 ft. in 48-A Alamitos and 10,818 ft. in 1 Stakemiller-Rose without finding any additional productive sands. In the Cantua district of Fresno County where a number of unsuccessful wildcats have been drilled in past years, Tide Water Associated Oil Co. is still held up with a fishing job at 10,073 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Coalinga district: Texas 3 Boychester, 18-21s-15e, bottomed in shale, lower variegated 2,882 ft., Kreyenhagen 3,043 ft., cored 8 ft. of fair oil sand at top of lower variegated, no test made, TD 3,065 ft.

Santa Barbara County, Los Alamos district: Bel-Air Oil 1 Price, 21-8n-32w, bottomed in tight gray sand, fair showing, swabbed water and mud with only trace of oil, TD 5,166 ft.

Oklahoma Fields

(Continued from Page 193)

up, drilling and testing. There are 519 oil wells in the Hunton lime zone, and 12 oil wells and 1 gas well in the Bartlesville sand zone. The leading operator is Phillips Petroleum Co. with 92 producing wells in the Hunton lime and 18 wells rigging up, drilling or testing. Estimated production of the field last week was 73,400 bbl. from 524 wells.

Efforts to find production in the Wilcox sand in the Bethany pool in Oklahoma County have thus far met with discouragement. The latest Wilcox test on the structure, Phillips Petroleum Co. 1 Ella, C NE NE 22-12n-4w, ½ mile northeast of the discovery well, was reported to have found Wilcox sand at 7,720-50 ft., with no oil showing. The Bois D'Arc section will next be tested.

Pure Oil Co. 1 Central Life, SW NE SW 26-3s-1e, Caddo pool, Carter County, outpost, extended the pool with an initial production of 300 bbl. of oil slightly cut, from Bromide sand at 5,332-37 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Hughes County: New oil pool—Deep Rock 1 Hudson, NE SW SW 32-7n-10e, flowed 138 bbl. in 13 hours from Cromwell at 3,833-41 ft., gravity 40°; TD 3,841 ft., Wapanucka 3,505 ft., upper Viola 3,778 ft., Cromwell 3,825 ft.

Kingfisher County: New oil pool—Phillips and Carter 1 Hasley, SE SE 28-16n-5w, flowed 13 bbl. in 3 hours from sand at 6,590-6,616 ft., TD 7,859 ft., May 6,697 ft., Woodford 7,042 ft., Hunton 7,088 ft., Sylvan 7,390 ft., Viola 7,496 ft., second Wilcox 7,850 ft.

Okfuskee County: New oil pool—J. E. Crosbie 1 Sykora, NE NE SW 20-12n-7e, pumped 119 bbl. from Cromwell at 3,860-80 ft., gravity 38°, TD 4,751 ft., PB 3,910 ft., May 4,300 ft., Woodford 4,420 ft., Hunton 4,447 ft.

Pottawatomie County: Jenkins & Dickson 1-A Goodnight, NW NW NE 4-5n-3e, pumped 38 bbl. in 22 hours from Layton at 2,838-40 ft., gravity 32.5°, TD 2,840 ft.

Stephens County: New pay in oil pool—Texas 1 Sears, SW NE NE 20-2n-8w, flowed 198 bbl. from sand at 6,714-62 ft., gravity 36°, TD 6,762 ft.

OKLAHOMA WILDCAT FAILURES

Garvin County: Schuster 1 Potter, SW SE 8-4n-3e, dry, TD 3,506 ft., second Wilcox 3,440 ft.

Lake 1 Ernest, SW SE SE 11-4n-3e, dry, TD 2,425 ft., base Permian 2,274 ft., Hunton and Viola missing.

Grady County: Olson Drilling 3 Pfile "B," SE SW SE 29-3n-7w, dry, TD 6,030 ft., Pontotoc 3,700 ft.

Logan County: Viersen and Mid-Continent 1 Acton, SW SW SW 21-19n-4w, dry, TD 5,675 ft., May 5,625 ft.

Osage County: W. Reese Dillard 1, SE SW NE 15-23n-9e, dry, TD 2,283 ft., May 2,265 ft.

Payne County: Ashland 1 Seeliger Commission, NE SE NW 32-19n-1e, dry, TD 5,251 ft., Misener 4,995 ft.

Seminole County: W. A. Delaney, Jr., 1 Damron, SE SE NW 7-5n-6e, dry, TD 3,316 ft., in Viola.

Stephens County: Globe Oil & Refining 1 Ault, SE NE SW 15-2s-6w, dry, TD 3,104 ft.

Magnolia 1 Smith, NW NW SE 15-2s-4w, dry, TD 2,261 ft.